SEPTEMBER, 1955

INDUSTRY & WELDING

Commemorating a Quarter Century of Service to the Welding Industry

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Quality Wins Out

Jackson's fully insulated, safe arc welding electrode holders have been made since 1934. More than 2½ millions have been sold.

Progress, through constant research, resulted in the best alloys for the tongs, the most durable fiber glass plastic for the insulation.

Model A-W, shown here, the world's most popular, exemplifies the high standards of quality maintained by Jackson Products.

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WARREN-MICHIGAN

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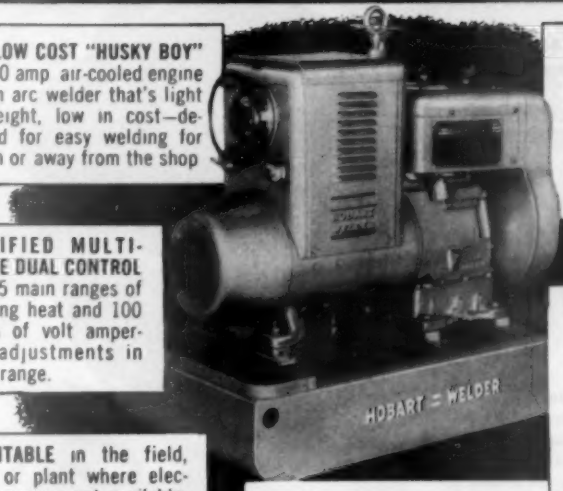
This "HUSKY" Air-Cooled arc welder will speed your welding operations for EXTRA PROFITS

THE LOW COST "HUSKY BOY" 200 amp air-cooled engine driven arc welder that's light in weight, low in cost—designed for easy welding for use in or away from the shop

RUGGED, DEPENDABLE OPERATION. Powered by a 2 cylinder industrial air-cooled engine with push button starting, or magneto equipped for hand cranking.



MODIFIED MULTI-RANGE DUAL CONTROL with 5 main ranges of welding heat and 100 steps of volt amperage adjustments in each range.

WELDS ANYWHERE due to its light weight and compact design. Two or three wheel portable mountings available Can also be mounted on your truck or trailer.

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Hobart Welders give you rugged, heavy duty construction, long life and trouble-free service, plus extra convenience features: modified multi-range dual control and auxiliary power outlets for operating lights and tools.

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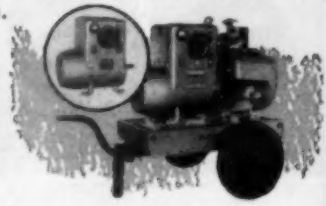
"CONTRACTOR SPECIAL"—a 250 amp Gas Drive model that's light and compact yet has plenty of engine power and a hot, fast, dependable arc.

ELECTRIC DRIVE 300 and 400 amp. welders ideal for production, maintenance and repair service Conservative rating lets you do heavy duty welding for limited periods of time.



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"One of the world's largest builders of arc welders and arc welding equipment"

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HOBART arc welders

For 50 Years... Sold the World Over

FIBRE-METAL HELMETS

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● The name FIBRE-METAL stands for highest quality... *quality* preeminent in the field of welding... based on broadest experience and continuing research to produce the kind of equipment that gives maximum protection to the welder... along with the comfort and "work ability" that enable him to produce more work per day.

FIBRE-METAL HELMETS: *First with Fiberglas®*

No. 600-3-C
No. 602-3-C

No. 604-3-C
No. 606-3-C

No. 700-3-C
No. 702-3-C

Inside view showing INNER BIB of "Series 400" Helmets for extra protection to welder's neck from flashes and reflected glare.

®OWENS-CORNING TRADE MARK

No. 400-3-C with #1130—Plastic Glass Holder
No. 402-3-C with #1085—Insulated Steel Glass Holder

No. 404-3-C with #1136—Plastic Lift-Front Glass Holder
No. 406-3-C with #1096—Insulated Dowmetal Lift-Front Glass Holder

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The smaller size and light weight of the Fibre-Metal Series 400 Helmets make them ideal for close quarters. They feature Fibre-Metal's superior Fiberglas® compression-molded shells, Beaded edges for strength and safety, Wide Range Headsize Adjustment, New 4-Position Helmet Stop, and provide four popular glass holder styles. Adjustable friction joints hold helmet in any position!

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FIBRE-METAL

WORKER SAFETY PAYS DIVIDENDS

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Industry & Welding

SEPTEMBER, 1955

VOL. 28 No. 9

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Art Director

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BPA

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American Welding Society
National Welding Supply Association
International Acetylene Association

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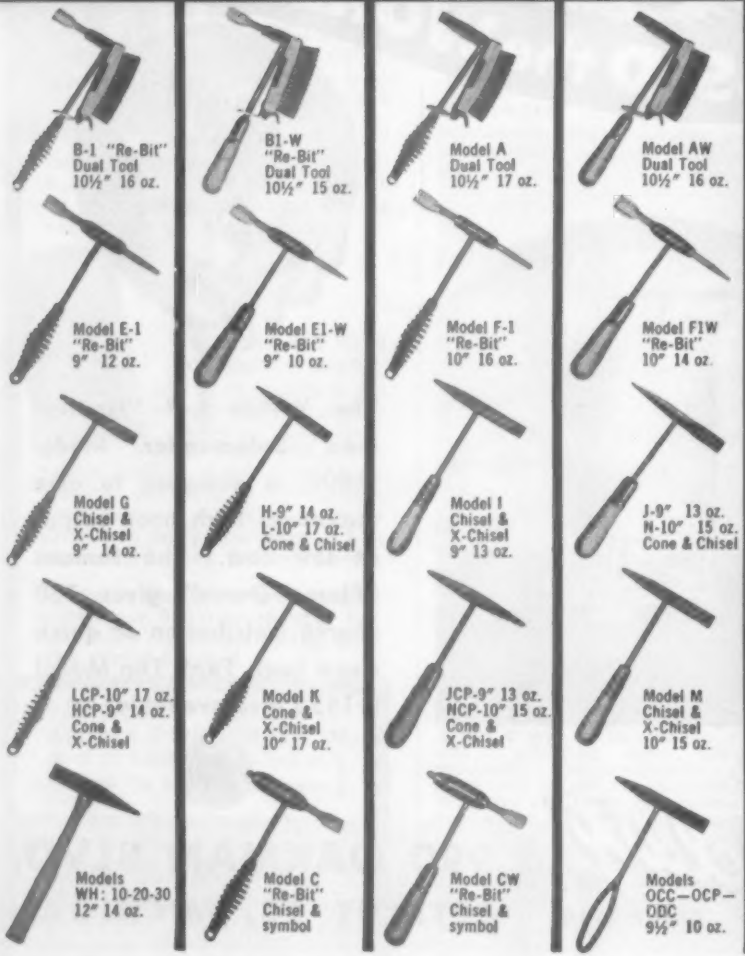
B-1 "Re-Bit" Dual Tool 10½" 16 oz.
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H-9" 14 oz. L-10" 17 oz. Cone & Chisel
Model I Chisel & X-Chisel 9" 13 oz.
J-9" 13 oz. N-10" 15 oz. Cone & Chisel
LCP-10" 17 oz. HCP-9" 14 oz. Cone & X-Chisel
Model K Cone & X-Chisel 10" 17 oz.
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Model M Chisel & X-Chisel 10" 15 oz.
Models WH: 10-20-30 12" 14 oz.
Model C "Re-Bit" Chisel & symbol
Model CW "Re-Bit" Chisel & symbol
Models OCC—OCP—ODC 9½" 10 oz.

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Why "Do It Yourself"

Standard MALLORY Electrodes *Cost Less, Weld Better*

Makeshift, "home made" welding electrodes can cost more than you realize. Not only do they take a lot of time to contrive, but they seldom have the strength, conductivity and cooling facilities to give good welds and satisfactory life.

Before you "do it yourself," take a look at what Mallory has to offer, in the way of unusual electrode shapes. Literally hundreds of single and double bend electrodes that you may consider special are standard Mallory designs . . . which we can make promptly and economically using existing tool facilities.

Exclusive Mallory cold-forming techniques shape these bent electrodes from full hard rod stock, and develop high hardness and strength far beyond what can be obtained by conventional hot forging methods. Cooling tubes may be bent in place* by a special process, to provide water flow as near to the welding face as in the case of straight electrodes. These extra values designed into Mallory electrodes assure you of long life, long runs between dressings . . . more welds per dollar.

For information on available designs, ask your local Mallory Welding Distributor for a copy of the latest Mallory Welding Catalog, or write directly to us.

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P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

*Patent Number 2489993

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

Circle No. 6 on Reader Service Card.

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cut Brazing Rejects to less than 1% in Refrigerator Compressor Dome Assembly

* Actual photo of refrigerator plant production line where 11 joints are brazed on one assembly with less than 1% rejected under Underwriter's pressure test of 1500 lbs. per sq. in.

Alloy brazing materials insure a perfect job every time . . . consistently uniform, trouble-free brazing with no rejects . . . no reworking!

No question about it—Production Brazing with Alloy Rings is the practical answer to many expensive metal joining problems. Investigate . . . production brazing can help you conquer those sky-high production costs.

Precision is of the utmost importance in successful brazing.

For infallible results insist on precision-made Alloy Rings. Special Alloy packaging methods speed production and cut waste to a minimum.

Write for full information on brazing rings, preformed shapes, silver alloy, copper, soft solder and flux.

Alloy RINGS

ALLOY RING SERVICE, INC. • 1087 EAST 52ND STREET • INDIANAPOLIS 5, INDIANA

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Welding stainless steel to mild steel in downhand position with Inco-Rod "A". See the finished weld in the picture below.

For welding dissimilar alloys ...NEW INCO-ROD "A"

TRADE MARK

You'll like the versatility of the new Inco-Rod "A"... It welds many combinations among such dissimilar alloys as ferritic and austenitic stainless steels, mild steels, low alloy steels, and high-nickel alloys.

Inco-Rod "A" is expected to give sound, strong and ductile welds on better than 90 per cent of dissimilar metal jobs in the average plant.

Write for free booklet on Inco-Rod "A". It gives you data on test-welds of 21 different alloy combinations — facts about the excellent tensile and bend properties obtained.

Six more reasons you'll like new Inco-Rod "A":

1. Ease of welding—Inco-Rod "A" has excellent operability in all positions — with spray-type arc and good slag removal.

2. Dependability — Inco-Rod "A" permits production of X-ray quality welds.

3. High corrosion resistance — Inco-Rod "A" produces welds with corrosion resistance expected to equal or exceed, in most cases, that of either alloy being welded.

4. Handy packages—Inco-Rod "A" comes in 5-lb., asphalt-lined, protective tubular containers.

5. Four convenient sizes—Inco-Rod "A" is supplied in 14-inch lengths in four diameters: 3/32" with center grip and 1/8", 5/32", and 3/16" inch with end grip.

6. Distinctive flux color — The green flux coating of Inco-Rod "A" prevents mix-ups with other electrodes.

Note close ripples and even contour of weld made with Inco-Rod "A".

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N.Y.

INCO
TRADE MARK

Welding Products

Electrodes • Wires • Fluxes

Circle No. 8 on Reader Service Card.

NEW REFERENCE DATA

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use postcard bound into this issue.

STAINLESS STEEL WELDING AND CUTTING is described in a revised booklet from Crucible Steel Co. of America. Seventeen methods used to join stainless, including manual and automatic arc welding, brazing and soldering are explained in easy-to-read "how to" form. Booklet also contains a section describing 8 flame and arc cutting processes used on stainless. **Circle No. 89.**

LENSES, SAFETY SPECTACLES AND GOGGLES that make up the EyeGard line are featured in 32-page catalog No. 103 issued by American Industrial Safety Equipment Co. Products are illustrated and suggested applications given for each. Company's BodyGard safety products are included. **Circle No. 90 on Reader Service Card.**

OXYGEN CUTTING MACHINE with automatic magnetic tracing attachment is featured in an illustrated brochure from Heath Engineering Co. Principles of operation, scope and usefulness and specifications are given for the company's Ultra-Graph machine. **Circle No. 91 on Reader Service Card.**

LAYING OUT PIPE JOINTS THE EASY WAY is explained in interesting new booklet describing a complete line of layout tools made by Contour Marker Corp. Described and illustrated in detail are a protractor-type layout tool, a centering head, a radius marker and a pipe flange aligner. **Circle No. 31 on Reader Service Card.**

LIGHTWEIGHT SAFETY GLASSES described in a new brochure from Willson Products, Inc., are extra large for extra protection. Made of impact-resisting acetate plastic material, FeatherSpec spectacles are said to be extremely comfortable, they can be worn for hours without fatigue or strain. **Circle No. 93.**

AUTOMATIC WELDING EQUIPMENT is described in interesting Bulletin 5301 issued by Cayuga Machine and Fabricating Co. Featured are welding positioners and turning rolls custom and standard pedestals, horn jigs and many others. How this equipment increases production, betters quality and reduces costs is explained. **Circle No. 94 on Reader Service Card.**

MAGNETIC AMPLIFIERS AND FUNDAMENTAL PRINCIPLES of their operation are explained in an instruction book issued by Vickers Electric Division, Vickers, Inc. Illustrated with simple charts, drawings and schematic diagrams, this instruction book is a valuable addition to technical files. It's punched for easy insertion into shop notebooks. **Circle No. 37 on Service Card.**

SUBMERGED ARC WELDING is the subject of a clearly written, helpful 20-page manual available from Sight Feed Generator Co. Reprinted from the A.W.S. Welding Handbook, manual gives welding procedures for a variety of applications and is effectively illustrated with photographs, drawings and charts. **Circle No. 95 on Reader Service Card.**

HAS YOUR PLANT TRIED

CADDY?

CADDY Arc Welding Accessories are all designed to utilize the finest of all electrical connections—CADWELD. From welding machine to electrode, the CADWELD connection has revolutionized the arc welding circuit. Today after five years of on the job analysis, companies all over the United States are standardizing on CADDY Arc Welding Accessories and CADWELD cable splicing.

The reason for the acceptance of the complete CADDY Arc Welding Circuit is that it proves itself to:

1. Purchasing . . . . "reduced inventory"
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Circle No. 9 on Reader Service Card.

HOW TO SELECT RESISTANCE WELDING CABLE of adequate capacity is the subject of 6-page manual available from Uniflex Cable Div., United Metal Craft Corp. Manual is in easy-to-use chart form and is based on performance data on 800, 500, 400 and 300 MCM cable. **Circle No. 96 on Reader Service Card.**

CHIPPING HAMMERS, WELD CLEANING BRUSHES, HAND STAMPS AND SYMBOL-HAMMER INSERTS are all described in an attractive illustrated guide bulletin published by Atlas Welding Accessories Co. Shown are four models of chipping hammers, each with reversible brushes and replaceable bits; a variety of tomahawks, some with replaceable bits, and over 100 hand stamps symbols for weld identification. **Circle No. 5 on Reader Service Card.**

A NEW TYPE OF GRINDING WHEEL—made in Austria and recently introduced in America—is featured in a 4-page brochure from B. Franklin Soffe & Associates. The illustrated brochure gives characteristics of the nylon-reinforced wheels designed for use on portable electric and pneumatic sanders. Sizes and recommended operating speeds are shown. **Circle No. 97.**

A NEW AIR-COOLED 20-HP COMPRESSOR made by Ingersoll-Rand Company is described fully in new 4-page, 2-color bulletin, Form 1540. Bulletin contains cutaway views and a table of specifications for Model 20T compressor which is equipped with Ingersoll-Rand Channel Valve and can be direct connected or belt-driven. **Circle No. 98 on Service Card.**

AN ACCURATE, HEAVY-DUTY CORNER CLAMP is introduced in literature offered by Gunver Mfg. Co. Designed to provide tight, exact right angles, Professional Corner Clamp is described as being ideal for welding and other metalworking and woodworking applications. Sizes available, prices and features are given. **Circle No. 99 on Reader Service Card.**

GET **LONGER** WHEEL LIFE

with the J & H VIBRATION DAMPENER

This low-cost, quickly installed accessory transmits the power from grinder to wheel through special, resilient rubber. This absorbs the shocks and jarring that ordinarily take the life out of the wheel! Result: Longer wheel life plus steadier, safer, more efficient grinding from each wheel.

Write for literature and prices.

J & H PRODUCTS CO.
3007 ELM ST., DALLAS 1, TEXAS

Circle No. 10 on Reader Service Card.

SIGMA WELDING BOOSTS STEEL FABRICATION 100%

A manufacturer of steel truck casters has doubled his production from 400 to 800 units a day—by changing to sigma welding.

120 in. per minute average welding speed. Once clamped, the parts are welded in less than ½ minute.

Used as welded—Free from spatter and flux entrapment, the need for finishing is eliminated.

Cut costs—Fewer production steps have made possible labor savings up to ½ the former costs.

Sigma welding is just one of the welding processes developed by LINDE's research and years of experience. HELIARC, sigma, and UNIONMELT welding form a top notch fabricating team which is now setting a new peak in industrial production. For small shops or huge production lines, from carbon steel to complex alloys and non-ferrous metals—there is a LINDE electric welding process to do the job efficiently and economically. Your local Linde representative will help you determine the best welding process for your job. Call him today for more information.

LINDE AIR PRODUCTS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street UCC **New York 17, N. Y.**
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Division of Union Carbide Canada Limited, Toronto
"Heliarc," "Unionmelt" and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation

Circle No. 11 on Reader Service Card.

SIGHT AND EYE SAFETY is explained in a 14-page booklet released by Silicone Paper Co. of America, Inc. The eye, how it works, how it can be injured and steps to aid recovery are presented in "Only One Pair to a Customer." Solution is given to lens cleaning problem. **Circle No. 100 on Reader Service Card.**

12-PAGE CATALOG OF WELDING GLOVES AND GARMENTS and other safety clothing and equipment is published by Syracuse Elbridge Co., Inc., as an aid in specifying and buying any type of work glove or protective garment. Popular styles are illustrated and variations of each are described. **Circle No. 101.**

GRINDING, SANDING AND POLISHING MACHINES for every industrial use, including weld grinding and finishing, are featured in a 4-page bulletin from Nedco Company. Operating specifications, standard and optional equipment and complete price data are given. **Circle No. 67 on Reader Service Card.**

GAS AND AIR HEATING for brazing, soldering, annealing and hardening operations is explained in 4-page catalog from Gas Appliance Service, Inc. In the catalog, the company explains how its turntable and conveyor-type heating machines, which use any commercial gas, make possible high production and maximum flexibility at low cost. **Circle No. 102 on Reader Service Card.**

MEMBERSHIP IN THE AMERICAN WELDING SOCIETY helps you improve your product, increase your production and lower your welding costs. You'll have for your own use latest available welding "know-how," including the Society's Monthly Journal and Welding Handbook. How you can join the Society and take advantage of its many benefits is explained in descriptive literature available. **Circle No. 103 on Reader Service Card.**

A DUAL-ACTION SANDER which roughs and finishes 3 to 5 times faster is featured in literature offered by Detroit Surfacing Machine Co. Complete specifications and operating instructions are given for sanding, scuffing, feather-edging, discing, polishing and buffing. **Circle No. 104 on Reader Service Card.**

save set-up time and money

Forget bolts and clamps — use these tools for firm magnetic clamping on welding or assembly jobs and save a pair of hands.

instantly adjustable to any angle

Eclipse **MAGNETIC ADJUSTABLE LINKS**

For descriptive literature and address of sales agent in your area, write to

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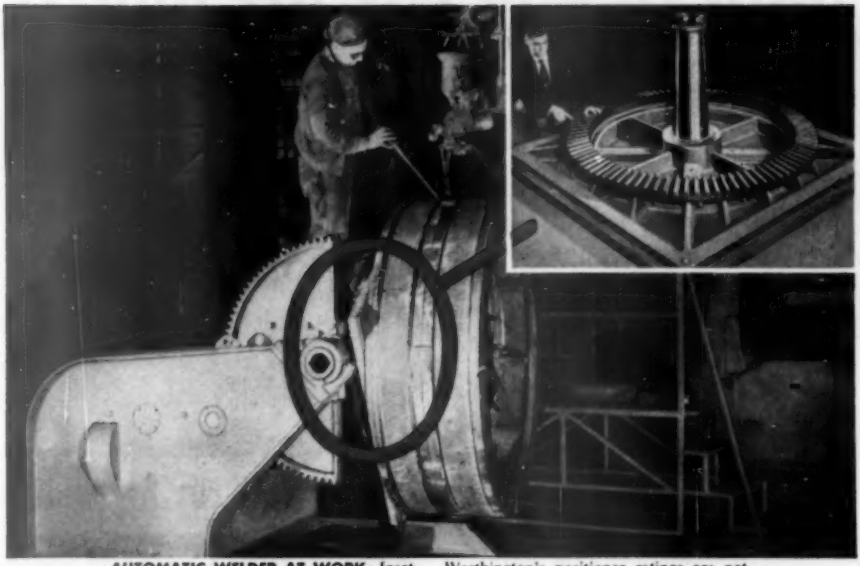
37/39 PEARL STREET, NEW YORK 4.

PM 18

Circle No. 12 on Reader Service Card.



AUTOMATIC WELDER AT WORK. Inset shows extra-large spindle and rugged bull gear of Worthington Welding Positioner, rated at 24,000 pounds, continuous duty

Worthington's positioner ratings are not just a by-product of the design. Rather, they are the result of extensive tests in laboratory and field

Double-check welding positioner ratings!

— *don't underestimate their importance*

In positioners, as in all Worthington products, ratings result from extensive tests in the laboratory and on the job.

Here are two steps that we take to assure you that every Worthington positioner rating is a *job* rating:

1. Each model is proved on the job before marketing as a standard unit.
2. Each positioner part, including motors, gears, and bearings, is selected to give you extra capacity for overload conditions.

Extra capacity, honestly rated, is typical of *all* Worthington Positioners — from smallest to largest, rated up to 50 tons.

No matter what your size requirements, there's a Worthington Welding Positioner for your job. Like all other Worthington products, its rating is backed by the integrity and reputation of 114 years of engineering experience. That's why you can rate our ratings as "conservative." Write for new Bulletin. Worthington Corporation, Harrison, New Jersey. Y59

FREE New Bulletin R-1700-B15 shows you how to choose a positioner. It answers the seven basic questions you should ask before you buy *any* positioning equipment.

WORTHINGTON

Welding Positioners • Turning Rolls

Circle No. 13 on Reader Service Card.

HOW TO BUY CUT-OFF WHEELS

FOR CLEANER CUTTING AND LONGER WHEEL LIFE

. . "More Use per Dollar"

Look for a wheel specially engineered and bonded to give you maximum cutting efficiency for your particular cut-off operations.

Safe, fast, clean metal cutting for sustained periods with a wheel that cuts freely, means savings in both time and money. You should look for a wheel that permits you to cut at high speed without burning, one that will leave no burr or discoloration and will last longer. To give you these advantages, the wheel you buy should be custom-bonded for your specific cut-off job . . . to assure smooth, free-cutting action whether you work with hardened or soft steel, light gauge tubing, critical alloys, etc.

Specify the wheel designed specifically for improved cutting on *your* job . . . specify Manhattan Cut-Off Wheels.

MANHATTAN CUT-OFF WHEELS

Manhattan developments in both rubber and resinoid bonds have greatly increased the cutting efficiency and long life of Manhattan Cut-Off Wheels. In factories where records are kept of the number of cuts per wheel, Manhattan wheels have proved they do a better job, longer . . . permit faster, cleaner cutting on *all* types of metals. Manhattan Cut-Off Wheels are manufactured in the widest range of types and sizes. Manhattan sales engineers will aid you in specifying the exact one for your operations and show you how you can save time and money —get "More Use per Dollar"—at your plant with Manhattan Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM-827-R **WRITE TO ABRASIVE WHEEL DEPARTMENT**

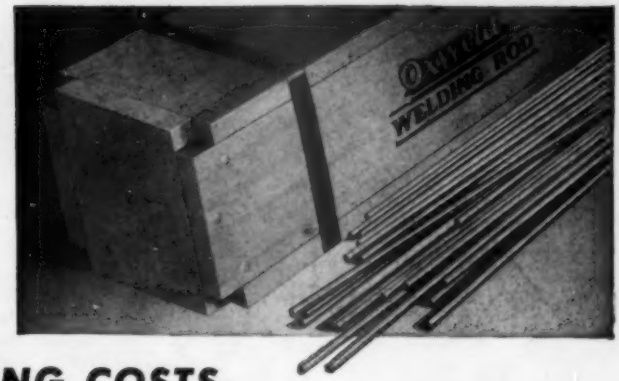
MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Circle No. 14 on Reader Service Card.

OXWELD
Trade-Mark
RODS



CUT WELDING COSTS

OXWELD rods are precisely engineered both chemically and mechanically to give only top performance in any welding shop. They help you to reduce welding costs because they permit you to:

USE LESS ROD PER WELD—OXWELD rods give high-strength welds with a minimum of reinforcement. Extra strength permits the use of less weld metal.

WELD FASTER—Highest quality ingredients in a rigidly controlled formula make welding with OXWELD rods easy and rapid. You save on gases and labor.

GET LOWER FINISHING COSTS—Welds made with OXWELD rods are uniform in quality, strength, and ductility; also easy to machine.

DECREASE ROD INVENTORIES—You need only five types of OXWELD rods to do all average welding and brazing. For specialized jobs, there are 9 more types . . . all available from one source of supply.

Ask your LINDE *jobber about* OXWELD *rods, fluxes and other welding accessories. Or write* LINDE AIR PRODUCTS COMPANY, *a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.*

See your LINDE Jobber

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

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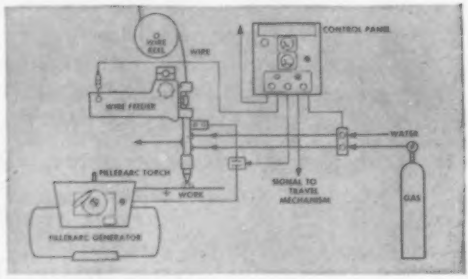


G-E FILLERARC EQUIPMENT is complete: special generator, wire feed, control panel, and automatic torch.

NEW G-E Automatic Welding System Uses CO_2 to Slash Gas Costs by 95%

FILLERARC . . . first *complete* equipment designed especially for automatic gas-shielded welding; combines improved generator with low-cost carbon dioxide—for sound welds on mild steel.

95% GAS SAVINGS are now possible with the new G-E Automatic Fillerarc Welding System. Use of CO_2—costing only **1/20th** as much as Argon—means yearly savings as high as $20,000 per equipment, on a 3-shift, 60% duty cycle basis.

SOUND WELDS ON MILD STEEL are now obtained with the exclusive G-E generator. Its rising volt-amp feature always maintains a constant arc length. This overcomes the erratic weld quality formerly obtained with CO_2.

COMPARED TO OTHER INERT-GAS SYSTEMS, G-E Fillerarc equipment . . .

- Reduces gas costs 95%.
- Delivers consistent weld quality.
- Assures constant speed in spite of normal line-voltage changes.
- Feeds wire up to 1000 i.p.m.

COMPARED TO FLUX-SHIELDED METHODS, G-E automatic Fillerarc equipment . . .

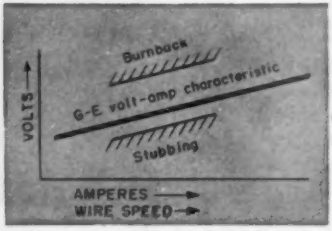
- Deepens penetration with CO_2.
- Provides visible, controllable arc.
- Eliminates abrasive flux.

FOR MORE INFORMATION contact your G-E welding sales engineer—and write for bulletin GEC-1334 to Section 713-1E, General Electric Co., Schenectady, N. Y.

SEE G-E automatic Fillerarc equipment demonstrated at the National Metal Exposition, Philadelphia, October 17–21.

Why the complete G-E system makes possible quality mild-steel welds with CO_2

UNIQUE SELF-REGULATING GENERATOR is designed especially for the process.



RISING VOLT-AMP CURVE of generator matches arc curve of CO_2 for high-quality welds.

DEEP PENETRATION is produced by short arcs, faster wire speeds of generator.

GENERAL ELECTRIC

Circle No. 16 on Reader Service Card.

NEWS of the WELDING INDUSTRY

Monsler Named to P&H Executive Group

Melvin O. Monsler, general manager of the welding equipment division of Harnischfeger Corp., Milwaukee, has been appointed a member of the company's executive committee. Mr. Monsler became general manager of the welding equipment division in 1953. Before that, he was sales manager for the division for two years. He started with Harnischfeger Corp. in 1937.

K-G Appoints New Distributors

K-G Equipment Company, Allentown, manufacturers of oxy-acetylene welding and cutting equipment, announce the appointment of the following distributors for their industrial equipment: D & R Welding Supply Company, Streator, Illinois; Burton C. French Company, Mansfield, Ohio; Gano Welding Supply Company, Charleston, Illinois; Keelor Steel, Inc., Minneapolis, Minnesota; Mercury Welders Service, Norfolk, Virginia.

Burdett Expands in Mansfield, Ohio

A new branch plant in Mansfield, Ohio, at 45 E. Longview Ave., has been completed by Burdett Oxygen Co., Cleveland, Ohio, according to President William H. Loveman. This new and larger plant is a modern one story, fireproof building 60 by 120 feet on a 300 by 400 feet site. The branch will carry a complete line of gases, welding equipment and accessories and safety clothing and equipment.

William A. Kaiser is manager.

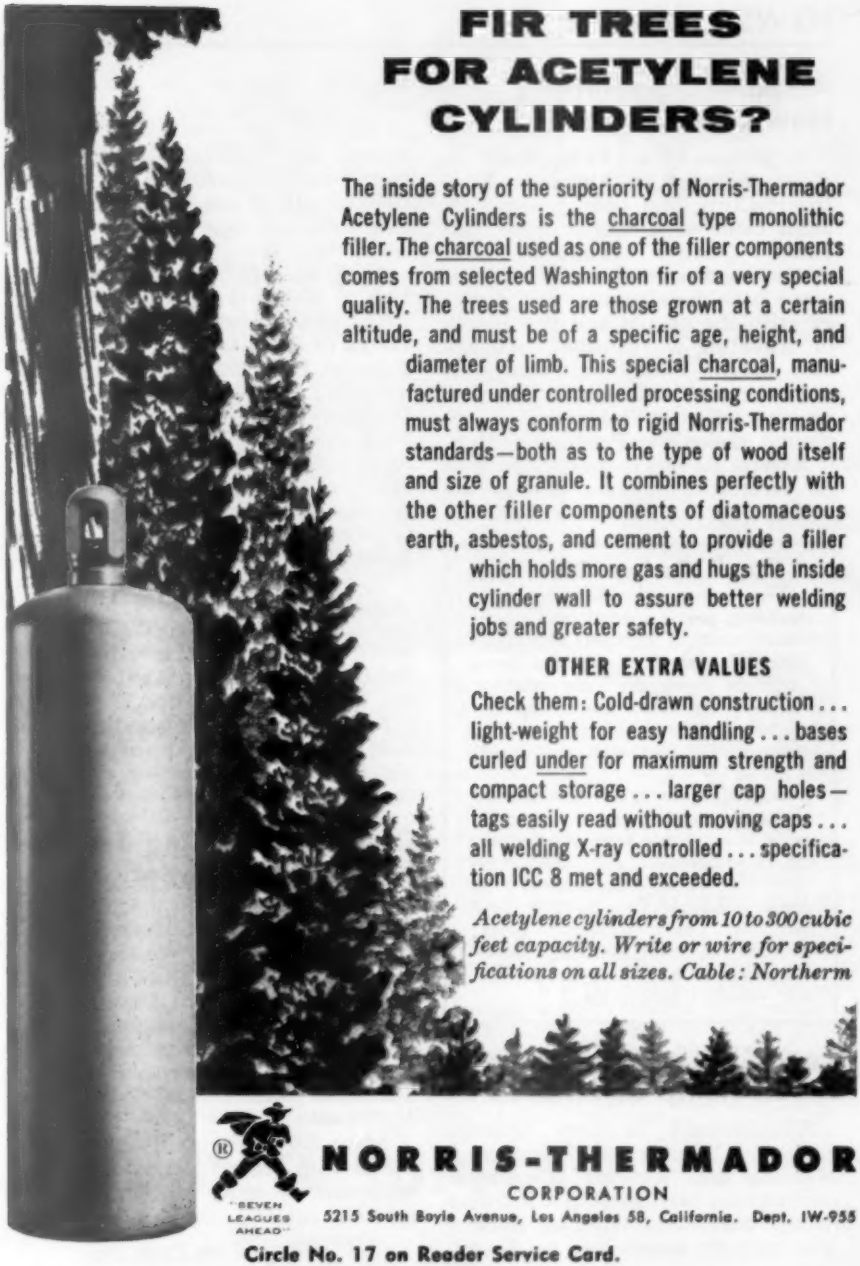
Mallory Appoints District Sales Manager

Barron W. Chandler has been appointed District Sales Manager for P. R. Mallory & Co., Inc., in the company's Indianapolis district. Chandler was formerly a sales representative in the Mallory sales office in Philadelphia.

Chandler attended the U. S. Naval Academy and the RCA Institute of Electronics. He has been active in the American Society for Metals and the Naval Alumni Association.

More news on page 22

Circle No. 16 on Reader Service Card.



FIR TREES FOR ACETYLENE CYLINDERS?

The inside story of the superiority of Norris-Thermador Acetylene Cylinders is the charcoal type monolithic filler. The charcoal used as one of the filler components comes from selected Washington fir of a very special quality. The trees used are those grown at a certain altitude, and must be of a specific age, height, and diameter of limb. This special charcoal, manufactured under controlled processing conditions, must always conform to rigid Norris-Thermador standards—both as to the type of wood itself and size of granule. It combines perfectly with the other filler components of diatomaceous earth, asbestos, and cement to provide a filler which holds more gas and hugs the inside cylinder wall to assure better welding jobs and greater safety.

OTHER EXTRA VALUES

Check them: Cold-drawn construction . . . light-weight for easy handling . . . bases curled under for maximum strength and compact storage . . . larger cap holes—tags easily read without moving caps . . . all welding X-ray controlled . . . specification ICC 8 met and exceeded.

Acetylene cylinders from 10 to 300 cubic feet capacity. Write or wire for specifications on all sizes. Cable: Northerm

"SEVEN LEAGUES AHEAD"

NORRIS-THERMADOR CORPORATION

5215 South Boyle Avenue, Los Angeles 58, California. Dept. IW-955

Circle No. 17 on Reader Service Card.

Amperex Appoints New Chief Engineer

Appointment of Peter Janis as chief engineer of Amperex Electronic Corp., has been announced. Janis came to Amperex from Sylvania Electric Products, Inc., where he was in charge of microwave tube development and worked with the design and production of traveling-wave tubes. He has also taught theory and design of monochrome and color television receivers for several years. A recipient of the War Production Merit Award, he has numerous patents on electronic devices, and is the author of many articles and papers.

"Dry" Carbon Dioxide

The carbon dioxide used as a shielding gas is special only to the extent that a certain degree of dryness is necessary. As the terms "dry" or "very dry" are relative, the only technical way to specify welding grade carbon dioxide is to indicate the minimum dew point required.

According to latest information available, welding grade carbon dioxide is available from the following companies: Air Reduction Sales Co., BevCo2 Division of Pipe Welding Supply Co., Burdett Oxygen Co., Liquid Carbonic Corp., National Cylinder Gas Co., Southern Oxygen Co., Valley Oxygen Co. and Welders Supply Co.

Lew Gilbert Heads A.W.S. Membership Committee

Appointment of Lew Gilbert, Executive Editor of Industry & Welding and Welding Illustrated, as National Membership Chairman of the American Welding Society was recently announced by Joseph Magrath, national secretary. According to Mr. Gilbert, activities of the Committee this year will be aimed at doubling the present membership of A.W.S. Cooperation of all present and potential members is urgently needed to reach this goal.

Assisting Mr. Gilbert, in addition to National Officers and district vice presidents, are Jack Jarms of Harnischfeger Corp.; Bob Jones of Bay State Abrasive Products Co.; Myron Stepath of Arcair Company; Frank Ford of Frank Ford and Associates; Ralph Quist in the San Francisco area; Dick Wiley of Cal Poly Tech in the Los Angeles area; Les Beaver of Beaver Welding Supply, Memphis; and Bent Laune.

Those interested in the advantages of A.W.S. membership may contact any of the people listed, or write directly to Lew Gilbert at Industry & Welding, 1240 Ontario St., Cleveland 13, Ohio.

For prompt information on A.W.S. and application blank, circle number 200 on the enclosed reader service card.

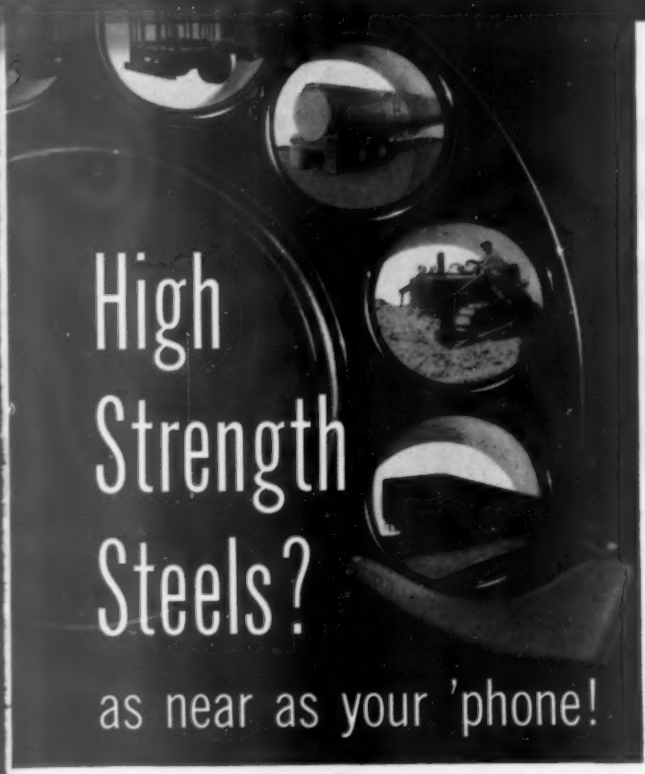
Canadian Welding Society Holds First Convention

Welding has played a top role in Canada's industrial development, the Hon. Robert H. Winters, Canadian Minister of Public Works, told delegates to the first annual convention of the Canadian Welding Society. The convention was held early in June as a part of the Canadian International Trade Fair at Toronto.

Some 250 delegates attended. Fifteen major technical sessions were held and welding equipment exhibited.

(Continued on Page 104)

Circle No. 18 on Reader Service Card. →



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When you need superior quality High Strength Steels, we can provide these famous USS products:

USS COR-TEN STEEL offers longer life with lighter weight, ideal for construction of trucks, tractors, trailers and equipment that must be moved or move other materials. It has 4 to 6 times the resistance to atmospheric corrosion of plain steel.

USS TRI-TEN STEEL gives greater strength and toughness coupled with exceptional weldability even when used in relatively heavy thicknesses. This steel is particularly useful for heavy-duty equipment in use at low temperatures.

USS MAN-TEN STEEL combines low-cost, formability, toughness and weldability with a high yield point.

Our warehouses, located from coast-to-coast, will supply the steels and supplies *you* want, *when* and *where* you want them. Lower your inventory, space, and production costs by using our services. Our technical staff is standing by to assist you with application or design problems . . . NOW!

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DIVISION

General Offices
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and Sales Offices
Coast to Coast

UNITED STATES STEEL

Call U.S. STEEL SUPPLY for ALL your steel needs...

- Structural Shapes
- Plates
- Bars—Hot and Cold Finished
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- Alloy Steels
- Stainless Steels
- Tubular Products
- High Strength Steels
- Aluminum
- Industrial Supplies and Machinery
- Reinforcing Bars, Wire Fabric
- Floor Plates, Industrial Flooring

USS STEEL
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FREE! VALUABLE LITERATURE

These important books on MAN-TEN, TRI-TEN and COR-TEN STEELS offer illustrated data covering the properties, performance, design and availability of these High Strength Steels.

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Please send me, free literature on:

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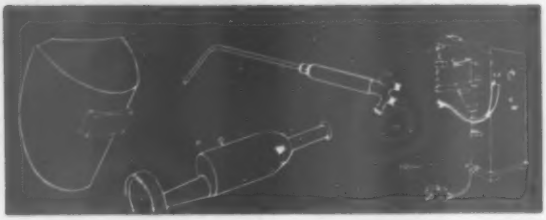
index to products advertised this month



This index, compiled for easy reference represents only those products advertised in this issue about which information was available prior to our closing date. All of our advertisers, however, are prepared to supply full particulars regarding their equipment, services and materials.

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Sensational New BURDOX BEAVER

Portable Cutting Machine

MOST POWERFUL . . . MOST EFFICIENT CUTTING MACHINE FOR ITS SIZE CUTS UP TO 4" WITH EASE

STRAIGHT LINE CUTTING using track to support grooved roller guide wheels.

BEVEL CUTTING is done in same manner with torch set at angle from plate as shown. All

CIRCLE CUTTING using radius rod with adjustable compass point fastening on any radius from 12/64" to 20".

SHAPE CUTTING by manually guiding the machine from plate or template.

Almost anyone can operate the BURDOX BEAVER because of its simplicity. Just set the speed and gas controls, light the torch and you'll get smooth cuts in a straight line, circles or shapes almost like magic. The entire machine weighs only 16 pounds, making it easy to handle on any cutting operation. Economical to use on special jobs or production runs. Cuts metal from ⅛" to 4" in thickness.

The BURDOX BEAVER is the only practical portable cutting machine on the market today equal in performance to larger, heavier more expensive equipment. Its low cost, its amazing performance features and trouble-free operation make it ideal for any size or type of plant. You save time, you'll save money and do far better cutting jobs with the BURDOX BEAVER all year long. Write for further information today. Use coupon below!

Every Product . . . every Process to fit every Purpose Best!

Please send information on Beaver Cutting Machine

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MAIL COUPON TODAY!

THE BURDETT OXYGEN CO.

3333 LAKESIDE AVENUE
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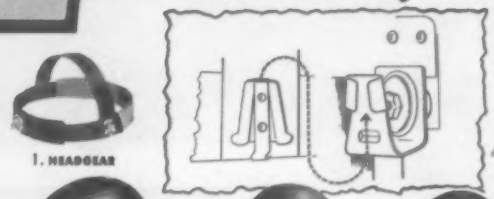
PLANTS: Cleveland, Dayton, Mansfield, Youngstown, Ohio & Los Angeles, California

BRANCHES: Akron, Cincinnati, Columbus, Ohio

CESCO RIGHT... before your Eyes!

NEW Mounting



1. HEADGEAR

2. HARD HAT

A. HELMET B. PLASTIC SHIELD C. SCREEN SHIELD

Assemble Your Own Combinations

Here's a way for you to save money on head, face, and eye protection equipment. Now you don't have to buy duplicate headgears or hats. If you need a helmet (A) and face shield (B), buy them along with only one headgear (1) or hard hat (2).

Items **A, B** and **C** can be used with either items **1** or **2** illustrated above so you can make six different combinations. The old-fashioned way you would buy a helmet and headgear, a shield and headgear, and so on until you had six combinations (twelve items) to do the same thing these five separate pieces will do.

The New CESCO Mounting has an easily adjusted tension spring to compensate for weight differences. Tilting mechanism permits easy raising and lowering. Wedge shaped brackets slide apart or together quickly, and lock securely.

Save buying extra parts... save money.
On your next order specify CESCO interchangeable helmets and face shields. They're—
"Right... before your Eyes."

Send TODAY
for CESCO literature and the name of your CESCO safety equipment distributor

CHICAGO EYE SHIELD COMPANY · 2334 Warren Boulevard, Chicago 12, Illinois

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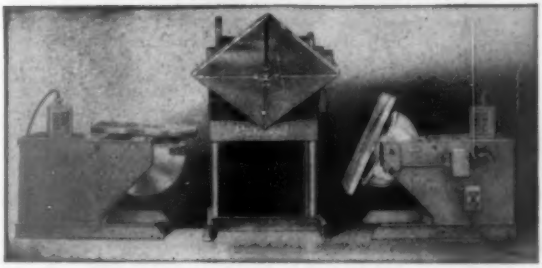
Circle No. 21 on Reader Service Card.

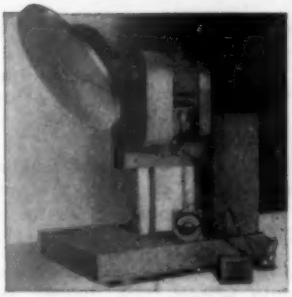
Steady, Positive, Precision Rotation for AUTOMATIC WELDING with *Aronson* Positioning Equipment.

UNIVERSAL Balanced POSITIONING
Model C 500 shown
25 lbs. to 2,000 lbs. capacity



HEAVY DUTY GEAR DRIVEN POSITIONING
Model HD 25 shown
500 lbs. to 24,000 lbs. capacity

HEAD and TAIL STOCK POSITIONING
Model HTS 5 shown
Capacities 5,000 lbs. to 160,000 lbs.



MODEL 21 (shown) SUPER GEAR DRIVEN POSITIONER with powered rotation tilt and elevation.

MODEL X-21 Powered rotation, ball bearing manual tilt and elevation.

MODEL 21-P Powered rotation and tilt, ball bearing manual elevation.

MODEL 21-E Powered rotation and elevation, ball bearing manual tilt.

MODEL X-21-PE Powered rotation, tilt and elevation.
5000 lbs. capacity @ 6" CG location.

Aronson TRACTRED Turning Rolls
Steady, positive, precision rotation for automatic welding. **MODEL T1** (shown) capacity 6,000 lbs. per unit. **MODEL T2** capacity 12,000 lbs. per unit. **MODEL T3** capacity 18,000 lbs. per unit.

HEAVY-DUTY PRECISION BUILT RUBBER TIRED TURNING ROLLS
5,000 lbs. to 150 tons capacity

Aronson **MACHINE COMPANY**
ARCADE, NEW YORK

Circle No. 22 on Reader Service Card.

Literature Featured In Ads This Month

(CIRCLE ON ENCLOSED POSTCARD NUMBERS OF LITERATURE YOU WISH TO RECEIVE)

33 **Welding design manual** and 56-page manual on truck and car fleet maintenance are featured. EUTECTIC WELDING ALLOYS CORP. Page 4.

6 **Resistance welding electrodes** claimed to weld better and cost less are described. Design details are given. P. R. MALLORY & CO., INC. Page 7.

8 **Welding of dissimilar alloys** is explained in new booklet which gives data on the welding of 21 different alloy combinations with new electrode. INTERNATIONAL NICKEL CO., INC. Page 9.

10 **Increased grinding wheel life** can be obtained with new vibration dampener. J & H PRODUCTS CO., Page 12.

12 **Magnetic link clamps** are described in literature which gives typical applications for these adjustable devices. JAMES NEILL & CO., LTD. Page 14.

13 **How to choose and use positioners** is explained in latest bulletin. WORTHINGTON CORP. Page 15.

16 **Automatic welding with CO_2 shielding gas** is explained in a new bulletin. GENERAL ELECTRIC CO. Pages 18-19.

17 **Acetylene cylinder specifications** are given in new literature. Quality control in cylinder manufacture is explained. NORRIS - THERMADOR CORP. Page 21.

18 **Three high strength steels** are described in separate illustrated booklets. Data covers design and performance. U. S. STEEL SUPPLY DIV. Page 23.

20 **Portable cutting machine** is described in new brochure. Unit is said to be lightweight and inexpensive. BURDETT OXYGEN CO. Page 25.

21 **How to assemble combinations** of headgear, helmets, face shields and safety hats is shown in latest brochure which is said to simplify purchasing and eliminate duplication. CHICAGO EYE SHIELD CO. Page 26.

25 **How to repair cast iron parts** is explained in new brochure. Arc welding electrode is described. INTERNATIONAL NICKEL CO., INC. Page 31.

26 **Tube notching machine** with interchangeable punches and dies is featured in illustrated technical brochure. VOGEL TOOL & DIE CORP. Page 32.

19 **How to use automatic welding wire** and how to select the most suitable wire is explained in folder. PAGE STEEL & WIRE DIV., Page 34.

28 **Resistance welding materials,** including wheels, tips, holder and bar and rod stock, are described and illustrated in bulletin. AMPCO METAL, INC. Page 35.

32 **Contact-type electrode** used with AC and DC welding machines are described in an interesting new bulletin. LINCOLN ELECTRIC CO. Page 49.

36 **Semi-automatic hard facing process** which uses continuous length of tubular wire is described in detail. STOODY CO. Page 61.

37 **DC rectifier welder** with magnetic amplifier is described in a new bulletin. Advantages and applications are shown. VICKERS ELECTRIC DIV. Page 63.

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Where the Weld is *the Heart of the Job* –

you have to be sure all joints are secure against invisible defects — and that calls for an Electrode Holder designed to get into tight places, with unvarying rod grip sureness. That's why HI-AMP Electrode Holders are preferred by so many fabricating and structural supervisors. Yes, you'll invariably find all HI-AMP Welding Products are employed wherever welding is a vital part of any operation. HERE'S WHY —

Sold only through Welding Supply Distributors in the U. S. and Canada.

• Spring completely enclosed and insulated. Cannot be knocked or shorted out. • Spring adjustment screw for ease of replacement and adjustment to rod size. • Handle cannot absorb moisture — withstands higher temperatures. • Tip Insulator reversible for longer service life. • Low Trigger for ease of rod relief — cuts down operator fatigue. • Slender rod gripping tongs to get in tight places.

Weld with Wagner

WAGNER MANUFACTURING CO., *Inc.*, JACKSON, MISSOURI

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REMOVES WELD METAL FASTER

Master Power pneumatic tools jump production and increase efficiency.

MASTER POWER pneumatic tools are precision built for rugged duty and quiet operation—light-weight to provide easy handling and reduce operators fatigue—hard chrome finished for trouble free service and 2 to 3 times longer tool life.

Whatever your weld finishing problem a test trial on your job under your own working conditions will prove the superiority and economy of MASTER POWER tools.

Chipping Hammers

Horizontal Grinders

Write for literature available on all models and sizes.

MASTER PNEUMATIC TOOL COMPANY, INC.
Orwell, Ohio

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38 **Electrode drying oven** is described in illustrated bulletin. PHOENIX PRODUCTS CO., Page 64.

40 **Oxy-acetylene cutting tips** and gas regulators are described in detail in 24-page catalog. K-G EQUIPMENT CO., INC. Page 67.

41 **Portable grinding wheels** are described and illustrated in latest technical literature. BAY STATE ABRASIVE PRODUCTS CO. Pages 68-69.

42 **Oxy-acetylene torches and tips** are described in interesting new catalog. AIR REDUCTION SALES CO. Page 70.

43 **Mild steel electrodes** designed for X-ray quality and easy slag removal is described. WESTINGHOUSE ELECTRIC CORP. Page 75.

45 **Seam welding wheels** are described along with other resistance welding equipment. WELDALOY PRODUCTS CO. Page 78.

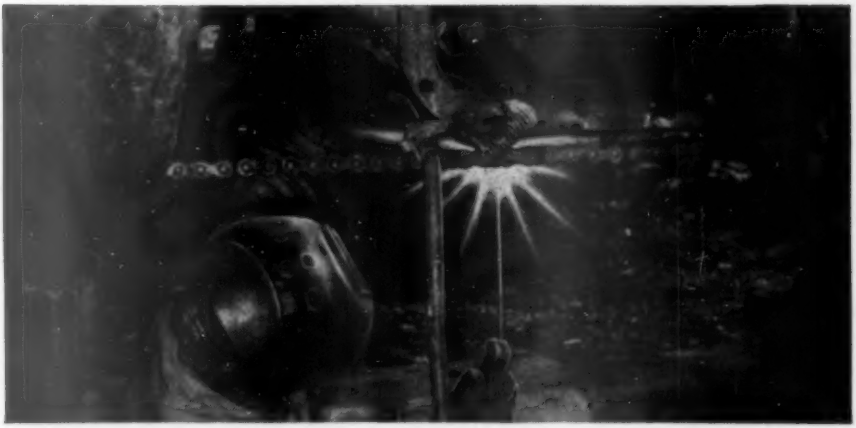
46 **Welding and cutting torches** and tips are described in a new detailed catalog. VICTOR EQUIPMENT CO. Page 79.

47 **Automatic fluxing system** for brazing is described in a new folder. ALL-STATE WELDING ALLOYS CO., INC. Page 80.

52 **Resistance welding electrodes,** holders, forgings, castings and bar stock are listed in new catalog. WW ALLOYS, INC. Page 85.

55 **Constant voltage DC welders** are described in detailed literature. Performance figures are given for manual, automatic and semi-automatic use. GLENN COMPANY. Page 87.

57 **New heating torch** which is said to mix gases safely without "backfiring" is described in descriptive folder. HARRIS CALORIFIC CO. Page 88.



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62 **Hard facing welding rod and repair shapes** for repairing manganese steel castings are featured in an illustrated bulletin. TAYLOR-WHARTON IRON & STEEL CO. Page 98.

69 **Resistance welding machines,** either new or used or rebuilt are described in a welder list. Specifications include cost and conditions. ROBT. W. HOFFMAN CO., INC. Page 105.

74 **Carbon brushes for welding machines** of all types and makes are shown in catalog with specifications and drawings. BECKER BROS. CARBON CO. Page 106.

77 **Universal iron bender** models are described in a bulletin, along with illustrations of bar, angle iron and pipe bends. HOSSFELD MFG. CO. Page 107.

70 **Contour cutting of pipe** is shown in detail in a new folder that also describes a shape cutter. H & M PIPE BEVELING MACHINE CO. Page 108.

72 **Multi-purpose welders' clamps** are described in the latest catalog which also shows chisels, punches, masonry drills, brace wrenches, etc. THE CINCINNATI TOOL CO. Page 109.

80 **Safety clothing for welding operators** is shown in descriptive literature along with price information. ALJAY MFG. COMPANY, INC. Page 111.

87 **Magnetic clamps** which have many uses are described in an illustrated bulletin. ARONSON MACHINE CO. Page 112.

88 **Electrode holders** said to be of unusual construction and light weight. Described in specification bulletin. DURO ENGINEERING CO. Inside Back Cover.

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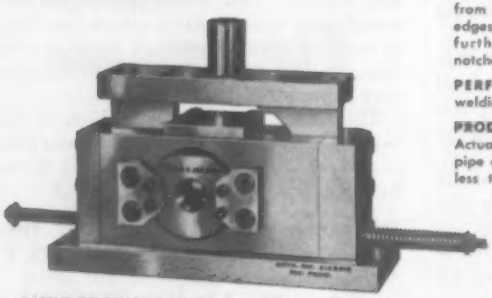

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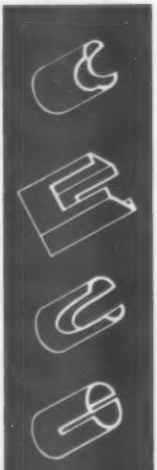

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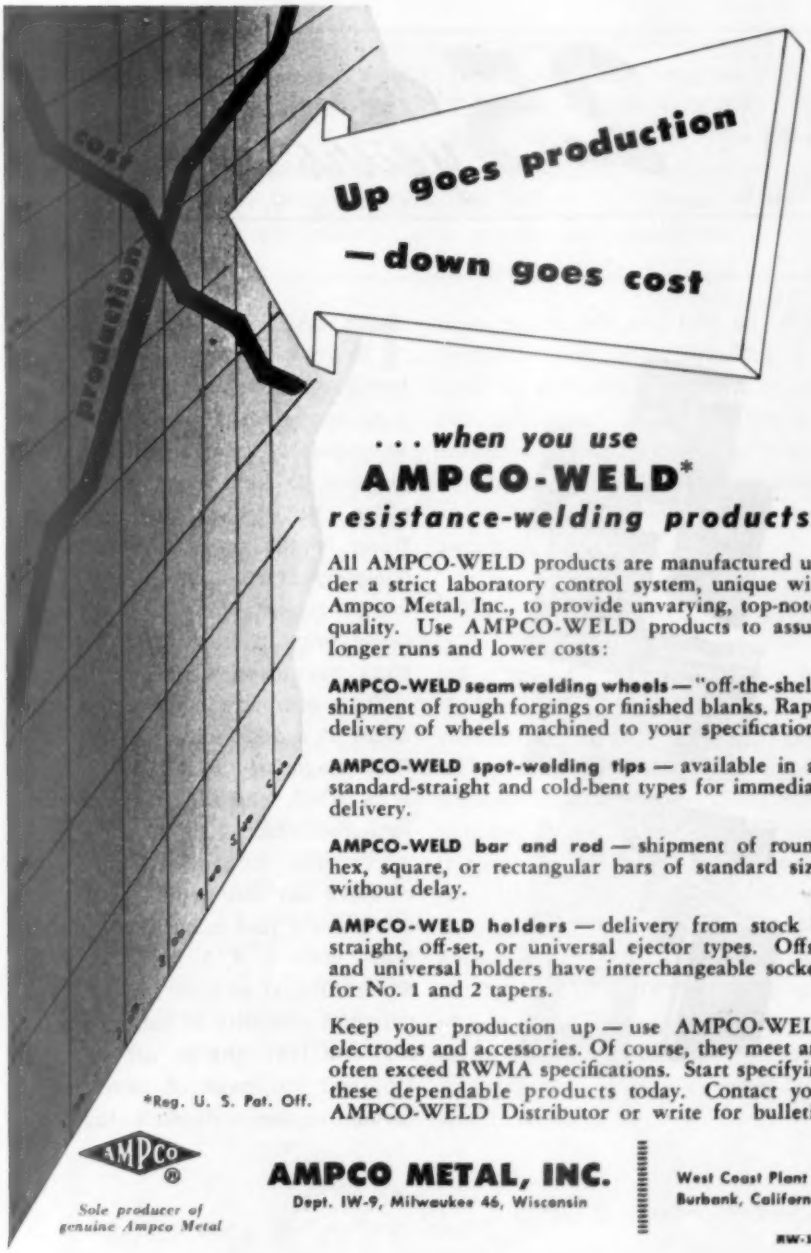

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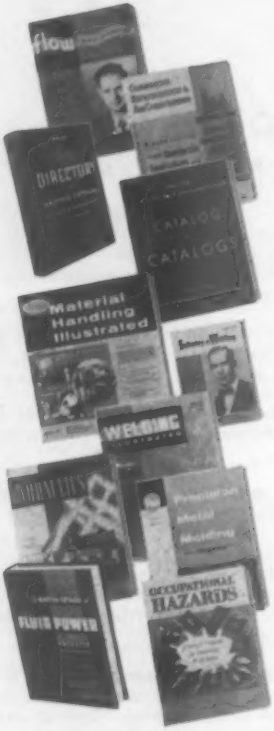
25 years



THE FACT that our company is 25 years old this month is relatively unimportant to anyone except ourselves. Thousands upon thousands of other companies have become 25 years old, and much older. But to us, the important thing is the way in which this company started, and the way it has progressed these 25 years. Because only in America could this story have been written.

This company started on the ashes of a depression failure. Our first magazine, INDUSTRY AND WELDING, had 24 pages in each issue, of which 3, 4, 5, or 6 were advertising. At 3, 4, or 5 pages, we couldn't pay our printer, but with 6 we could just make it. Whether there were 3, 4, 5, or 6 pages of advertising at no time removed the personal necessity of eating, dressing, and traveling to get the 7th, 8th, and 9th page of advertising. Somehow, we muddled through.

Five years ago, on the occasion of our twentieth anniversary in business we ran this editorial. It is just as true today as it was then. Change the figure "20" to "25" and you have our story today EXCEPT that we have enjoyed five more years of building, five more years of health, five more years of God's blessings for all of which we are truly thankful, and will do our utmost in the next five years to maintain your respect and confidence.

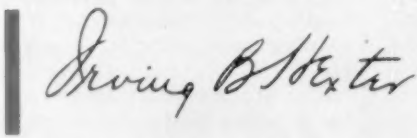
In America, you can do those things—with pride.

Many were the times when it looked as though we couldn't make it, and always, when it looked blackest, some miracle would happen and we'd be in business—for another month at least. We stuck. Friends were good to us. People had faith in what we were doing. You find that Americans like to help other Americans who are trying to help themselves. It is the essence of our country, of free enterprise.

No government questioned our right to be in business. No bureau told us what to print or how it should be said. We were free to make whatever profit we could manage and reinvest it in our own business or in any other way we saw fit. That, too, is the American way.

We chose to start magazines in other fields. No one told us what fields to start in or whether we could go into them. As long as we were willing to work and take the beating that every new, small business must take, we were permitted to build our own business in our own way.

These 25 years have been gratifying ones. It has been fun building a business. There's been a lot of hard work, long hours, and various worries, but we're glad we're in the publishing business, because we feel that we have contributed something to industry and to the general welfare of our country. We shall continue to do so. But again we say, ONLY IN AMERICA COULD THIS STORY HAVE BEEN WRITTEN. It is one of our great heritages which, unfortunately, we take for granted, and it's one worth keeping and worth fighting for.



Irving B. Hexter, Publisher

New developments in automatic submerged arc welding, made by Babcock & Wilcox Company, cut power costs in half and . . .

Deposit Weld Metal 5 Times Faster

A NEW automatic submerged arc welding process, said to deposit metal up to five times as fast as comparable welding methods, and at half the power cost, has been developed by the Research Center, Babcox & Wilcox Co., Alliance, Ohio. Known as the I^2RT method, the process is also applicable to inert arc welding.

Standard submerged arc welding practices have been based on the principle that deposit rate is directly proportional to diameter of the electrode. This theory also holds true with coated electrodes where current density is limited. However, tests showed that desired weld pattern could be made at deposit rates that were inversely proportional to wire size for a given current. In one case, a higher deposit rate was obtained using $\frac{3}{32}$-inch diameter wire at 650 amps than with $\frac{1}{4}$-inch wire at 800 amps.

Subsequent tests showed that the deposit rate at high current density is directly proportional to the length of electrode from contact shoe to the arc. This discovery led to the I^2RT principle of submerged arc welding which involves preheating the electrode almost to its melting point prior to entering the arc.

The arc does not have to supply the sensible heat required to bring

metal to the melting point as in standard submerged arc welding. Rather, energy absorbed by the electrode at the arc supplies heat of fusion to melt the metal.

Formula: I^2RT

Energy required to heat electrode to the melting point is measured in terms of the square of the current (I^2), resistance (R) of the electrode wire projecting from contact nozzle to arc, and time (T) that current flows through a given cross section of wire.

The new welding technique uses current densities in the range of 70,000 to 270,000 amps psi which are possible only with submerged arc or inert arc processes. Coated electrodes would be damaged by such high densities.

Carbon steel wire electrodes are currently used for production work, but experiments show the new process can make use of alloy electrodes with equal success. The only difference is that electrical resistance is higher in alloy grades.

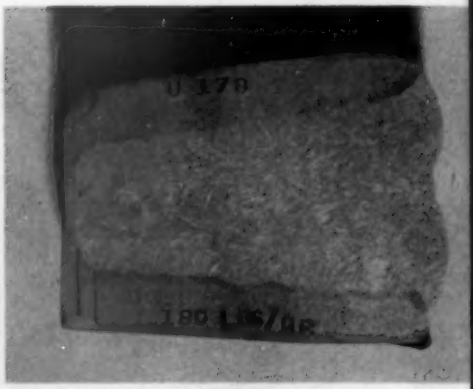
In operation, a voltage-sensitive relay controls the length of electrode projecting from the nozzle. Changes in load voltage are received by this relay, which signals the raising or lowering of the welding head.

Flux Depth Is 1½-Inches

Wire is fed through a granular flux composed of finely divided metal oxides. A flux depth of one-inch to 1½-inches is maintained. Because rapid metal deposition is required, a special guiding device "trues up" welding head and arc with work. Beads are deposited much too rapidly for manual guidance.

The new process is said to be faster, more efficient and more economical.

It is speedier because, with a current input of 1000 amps, it can deposit metal up to 100 lbs. per hour. This is more than three times as fast as previously.



Butt joint in 3-inch plate was made at deposit rate of 180 pounds per arc hour using new I^2RT submerged arc process.

Greater efficiency is based on the fact that all energy is applied directly in the electrode to heat the wire. There is no dissipation of energy in melting base metal and heating flux. Using 2½ times as much energy as present welding methods, the new technique can melt five times as much weld metal.

Power Cost Is Halved

Resulting improvement in efficiency is reflected in cost reduction. Test results show that the process used 0.65 kwhr per pound of electrode. Comparable welding methods consume about 1.2 kwhr to weld the same amount of filler metal.

Conversion of existing equipment to I^2RT would consist mainly of installing suitable transformer capacity and increasing wire feed rate. Since the new process needs double the load voltage, it would be necessary to provide larger or additional transformers. Travel speeds would also have to be increased.

Operator puts finishing touches to a pipe weld. Ceramic back-up rings make possible "icicle-free" even contours inside pipe. Root passes show complete fusion and sound, clean weld metal.

Ceramic Back-Up Rings for Pipe Welding

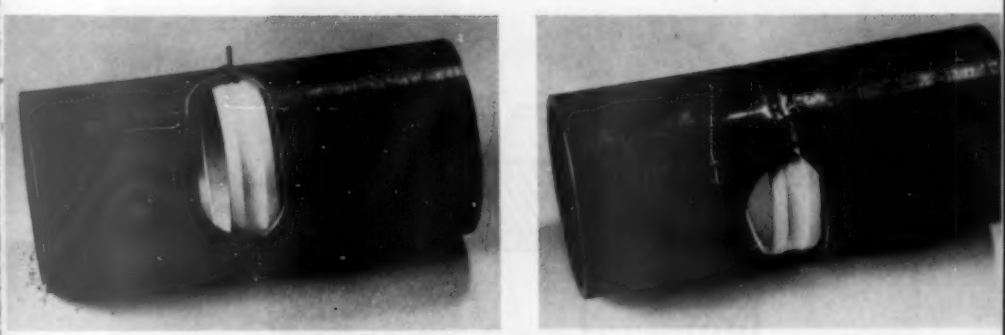
by **LEW GILBERT**
Executive Editor

THE elimination of permanent back-up rings, without sacrificing quality and appearance of inside root passes, has long been a serious pipe welding problem.

In order to avoid the necessity for expensive, and sometimes difficult grinding and chipping operations inside the pipe, many different welding methods have been tried.

Although in some cases pipe has been welded without backing of any kind, results have been too uncertain, particularly where good quality is a factor. Too often irregular contours and "icicles" dropping through from root passes have set up areas of erosion which have eventually caused failures.

In attempts to eliminate the problem, many companies have



Two cutaway views show ceramic back-up rings in welding position. Difficult grinding and chipping operations inside pipe are virtually eliminated.

spent considerable sums of money. Much experimenting has been done. Yet, until recently, only back-up rings of various types have been effectively used. Some of these, better than others because they have been contoured to reduce flow turbulance, have become standard in many pipe shops. Others are still chipped out whenever possible.

Everyone Gets in the Act

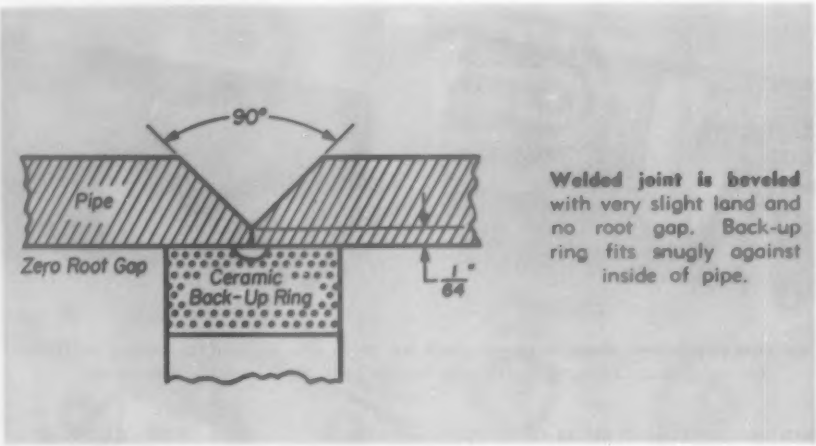
Some pipe fabricators use copper chill rings which they remove after welding. Others have used granular flux, inert gases under pressure and even pressure sensitive tape made of glass fibres. All of these including a new method recently announced by a well known pressure piping fabricator, have had certain deficiencies which make them difficult to accept as standard procedure.

A recently introduced new product, seems to provide solutions to many of the most difficult pipe welding problems. This product, a ceramic material engineered to be extremely heat resistant, is fabricated into back-up rings in a variety of sizes and diameters. Used in pipe fabrication, the new material has provided a means for producing inside contours as uniform as outside root passes. Welding is thus speeded up, less skill is required to produce quality welds and the rings are easily removable after welding is completed. In addition, they withstand rough handling and are adaptable for either shop or field use.

Here is a report on a series of experiments conducted by an important piping fabricator. Results of these tests proved that pipe joints of exceptionally sound quality, without pin holes, undercut or inclusions of any kind can easily be produced by using ceramic backing rings. It was also established that alignment of pipe sections was made much easier.

Set Up Welding Procedure

Original problem was to set up a procedure for satisfactorily welding polished ID stainless steel (type 304) piping with as little as possible under-bead reinforcement. It was essential that no porosity, undercutting or deformation of any kind be present. Be-



Welded joint is beveled with very slight land and no root gap. Back-up ring fits snugly against inside of pipe.

cause of the use to which pipe was to be subjected, and because of the complexity of assemblies, welds could not be further chipped, ground or polished. The first root pass was to be perfect enough to eliminate any necessity for further handling. It was a difficult assignment for this company's engineers.

Severe Quality Specifications

Customer quality specifications were severe. The use of any metal back-up was entirely ruled out. Because the use of an inert-gas back up did not give the necessary control of underbead contour, this method also was ruled out. It was essential that a method be developed which would consistently produce acceptable results for every joint. Welds were to be made with a technique that would allow use of minimum amperage with maximum penetration. Complete fusion and sound, clean metal *the first time* was a must.

To be sure that tests actually compared with on-the-job production problems they were set up that way. All welds were made out of position because field welds would, of necessity, have to be made that way.

Using the tungsten inert-gas shielded arc welding process, a series of welds were made on 2" sch. 40 stainless piping with polished interiors. After a variety of back-up materials were used, and joint designs changed many times, it became apparent that some special material would be necessary. It was decided that such a material should have physical properties of a metallic insert, but chemical properties of an inert igneous material such as ceramic. It was determined that only a material of that kind could withstand the terrific direct welding heat without deteriorating. Ceramic rings provided the solution, met all job requirements and customer's quality specs.

Preparation and Procedure

After first beveling the joints to a 45° angle with a very slight (1/64") land, they were thoroughly cleaned of any oil, grease or scale. Stainless steel wire brushes were

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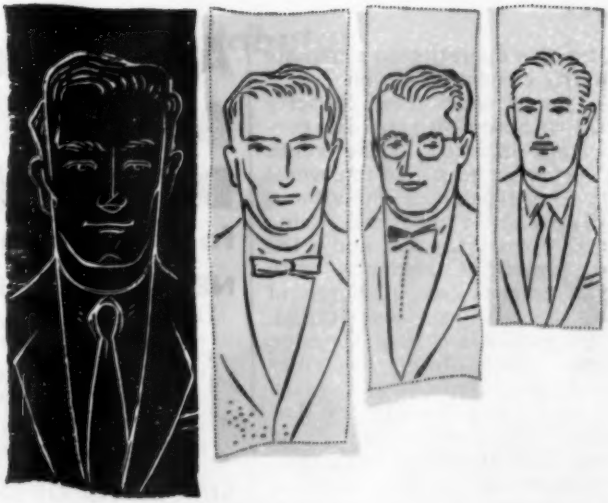

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used for this operation to eliminate possibility of contamination.

The joints were then properly aligned without root gaps, and ceramic rings inserted. Tack welds, about ¼" were deposited in several spots. These were made without use of any filler material. Using argon as a shielding gas, and a DC selenium rectifier welder — with straight polarity—as a source of power, the root pass was started. For this pass a 1/6" dia. tungsten electrode was utilized. No filler material was required since the land area was fused together smoothly on the ceramic ring backup. Low amperage (45 amps) low voltage (15V) and a speed of about 3 inches per minute were used for this first pass.

More Amps for Second Pass

The second pass, also deposited at almost three inches per minute required higher amperage (60 amps) and voltage (25V) and 1/16" filler material of the same composition as the pipe.

A third pass, using 3/32" bare filler rod, required 70 amps and 30 volts. This was deposited at the rate of just over two inches per minute.

Final passes, to complete the welds, were deposited at approximately the same amperage and voltage.

Upon completion of the welds, ceramic backing rings were removed and inside contours examined. They were smooth, with a maximum under bead reinforcement of .010" and of uniform contour. The use of these rings has now become standard accepted procedure.

For more information concerning these new Back-up Rings, write Editor, Industry & Welding Magazine, 1240 Ontario St., Cleveland 13, Ohio, or Circle No. 201 on Reader Service Card.

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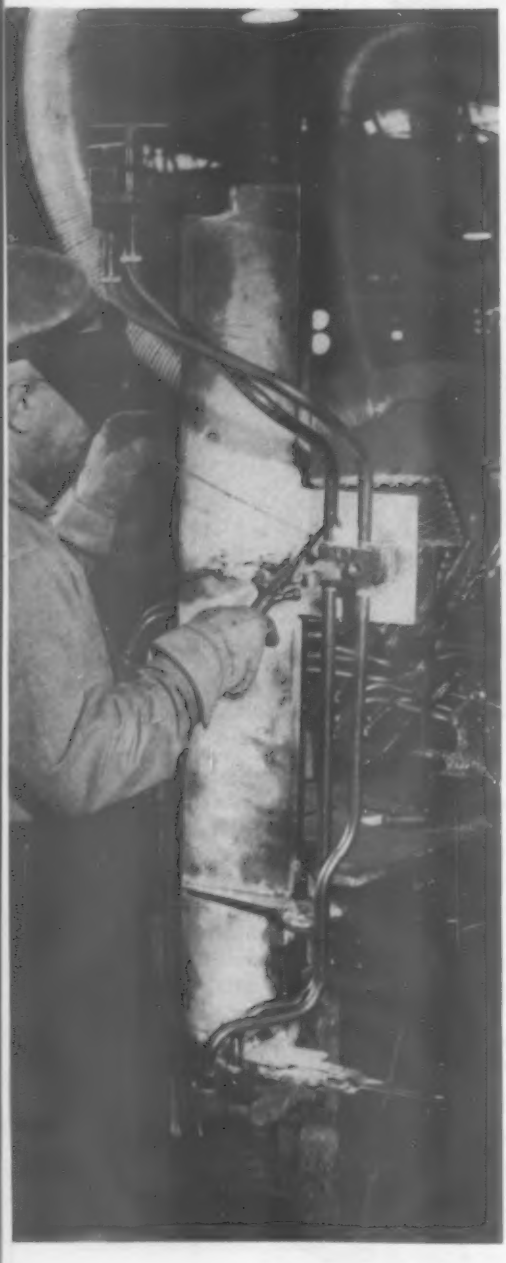


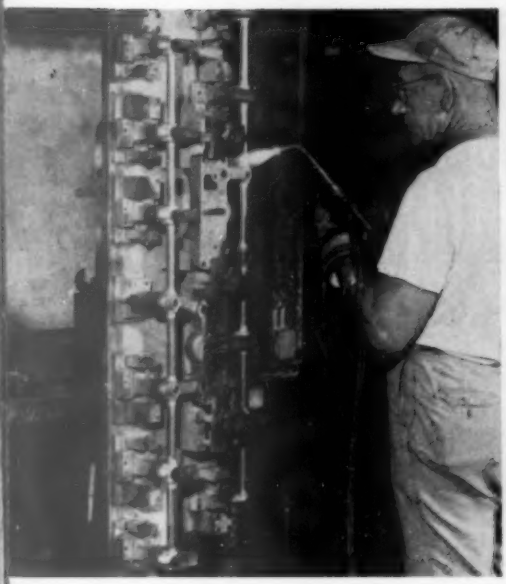
Brazed components are an important part of engine-powered tractors, the modern work horses of the construction industry. In the more than 50 years it has been turning out such rugged thoroughbreds, Caterpillar Tractor Co. has developed interesting brazing techniques.

by **CHARLES BERKA**
Associate Editor

How to Braze

CAREFUL attention to details insures quality brazing of low pressure oil line assemblies and water and fume disposal tubes at Caterpillar Tractor Co., Peoria, Illinois. Used primarily in diesel engines for tractors, motor graders and earth moving equipment, brazed assemblies are made from

ABOUT THE PHOTO
Quick-acting toggle clamps are built into this brazing fixture. Operator joins four lengths of 18-gauge welded steel tubing to cast iron fitting, using $\frac{1}{16}$-inch nickel-copper filler rod.



Special brazing fixture permits two brass oil line manifolds to be brazed at one time. Brazing alloy with 35 percent silver is used.

Six-station brazing fixture is used to join stellite wear pads to steel forgings. Pads are held in place by quick-acting toggle clamps.

Fittings to Steel and Copper Tubing

miscellaneous tubing that includes seamless, welded steel, Bundyweld and copper tubing types. Tubing has inside diameters ranging from $\frac{3}{16}$ to $\frac{3}{4}$-inch and is brazed to itself or to fittings of steel, brass and cast grey iron.

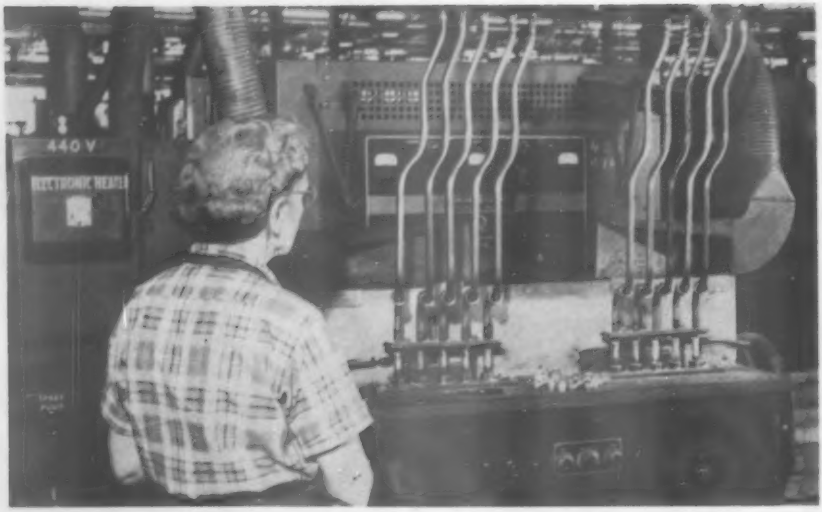
Attention to Details

In preparation for brazing, all areas to be brazed are thoroughly cleaned and degreased to make sure they are free from paint, oil, grease, rust or other foreign materials. Thorough fluxing insures that entire joint will be wet so that the brazing alloy will flow properly when heated.

Importance of proper flame adjustment and heating are also impressed on operators. A neutral flame is used to avoid excesses of oxygen and acetylene. Heavy sections are heated first and torch is kept moving to prevent local overheating and to bring joint members to the brazing temperature at the same time. Operators are cautioned to avoid overheating and possible melting of base metal.

Examine Tubing Closely

Tubing size and condition is also examined closely. After burrs are removed from O.D. and I.D. of the ends of tube, concentricity is checked to make sure tubing meets



Induction brazing is used to join steel tubes to steel fittings. Low temperature silver brazing alloy rings are used.

plus or minus .003-inch tolerance. A covering tape or plastic plug protects tubing ends when tubing is not being worked or when it is in transit.

Braze Brass Manifolds

A typical example of brazing at Caterpillar is an assembly of brass oil line manifolds which are designed for use in diesel engines used in and around salt water. In this operation five brass fittings and one junction box are brazed to four lengths of ⅝-inch outside diameter, .065-inch wall tubing.

Component parts are first fluxed and then assembled and positioned for brazing in company-designed fixtures. Two complete manifold units are assembled and brazed in each fixture. Parts are torch heated to 1100-1125° F and then $\frac{1}{16}$-inch diameter filler rod of 35% silver brazing alloy is added. Joint clearance is kept at .003-.005-inches to insure adequate flow and penetration of brazing alloy.

Thorough inspection follows brazing operations. A shot test in which a metal ball is dropped through all tubing is first made to insure that all passages are unobstructed. Then water pressure tests are used to check for leaks.

Join Steel to Cast Iron

For use where corrosion-resistance is no problem, oil line manifolds for diesel engines are made from 18 gauge welded steel tubing with .049-inch wall and cast iron fittings. These assemblies are brazed in the same manner as their brass counterparts, except that a high temperature nickel-copper brazing alloy is used. Brazing heat is about 1450° F.

Cast iron fittings are thoroughly degreased before brazing. Edges are chamfered to insure adequate

(Continued on Page 96)

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Every production lot of Alcoa* I.G. Electrode is test welded and the welds X-rayed for soundness. Each 10-lb spool is individually packed to maintain the super-smooth finish to assure soundness of weld and smoothness of feed. Each of five alloys, 1100, 4043, 5154, 5254 and 5356 (formerly 2S, 43S, A54S, B54S and XC56S), is available in six diameters. There is no better electrode.

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Your Stainless Welds—Are They Corrosion-Resistant? Leak-Tight?

Disposal of waste products is one of the big problems of the atomic age. Called on to build four corrosion-resistant, leak-tight stainless steel tanks to hold radioactive material, Alloy Fabricators instituted one of the most extensive quality control programs ever seen. From rolling of plates at the mill to final loading for shipment, it was check and double check, test, re-test and inspect.

by A. GRODNER, Chief Engineer, Alloy Fabricators Division, Continental Copper and Steel Industries, Inc.

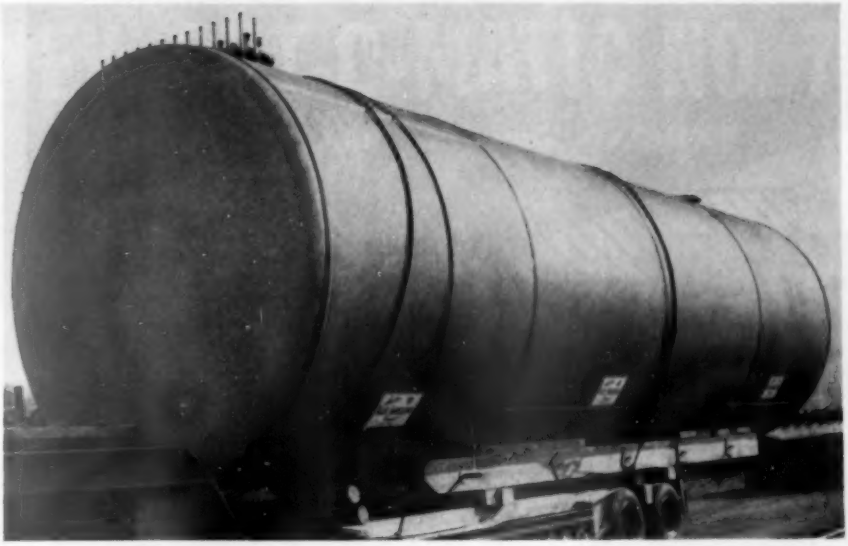
THE Atomic Energy Commission recently asked Alloy Fabricators Division, Continental Copper & Steel Industries, Inc., Perth Amboy, N. J. to fabricate four large stainless steel tanks for the storage of atomic waste products.

These tanks are 11'6" O.D. x 38'0" tangent to tangent of the end flanged and dished heads. The cylindrical shell is made up of four courses, each course of half the circumference, and all plates 11/16" thick. The ASME flanged and dished heads are of one piece, ½" thick, heat treated after forming. The shell and heads, as well as all nozzles and internal parts, are of stainless steel Type 316 ELC (extra low carbon). Each tank has a capacity of 30,750 gallons and weighs 48,000 pounds. The tanks were designed in accordance with the 1952 Edition of ASME Code for Unfired Pressure Vessels for an external pressure of 10 psig, at 200°F.

Because of the hazardous nature of service conditions, many precautionary measures were adopted in the preparation of material and fabrication specifications by engineers of Chemical Plants Division of Blaw-Knox Company, to insure utmost quality of the final product. To secure maximum resistance of parent metal and welds, quality control became the watch word and paramount requisite for each step, from rolling of plates at the mill to the loading of finished tanks for shipment. This quality control manifested itself in the materials of construction, in welding of the joints, and in the inspection and tests.

Materials of Construction

In 1940, metallurgists began to study the behavior of very low carbon austenitic chromium-nickel stainless steels exposed for short periods of time in the carbide precipitation range. It soon became apparent that when carbon content was kept at a lower level, susceptibility to intergranular corrosion was reduced and that these lower carbon grades could replace columbium or titanium stabilized



48,000 pound stainless steel tank for storage of atomic waste products is ready for shipment. Tank has $\frac{1}{16}$-inch shell; flanged and dished heads are ½-inch thick.

forms of these stainless steels. This characteristic was especially important for structures which are not stress relieved and which are subject to temperatures in the carbide precipitation range only during welding.

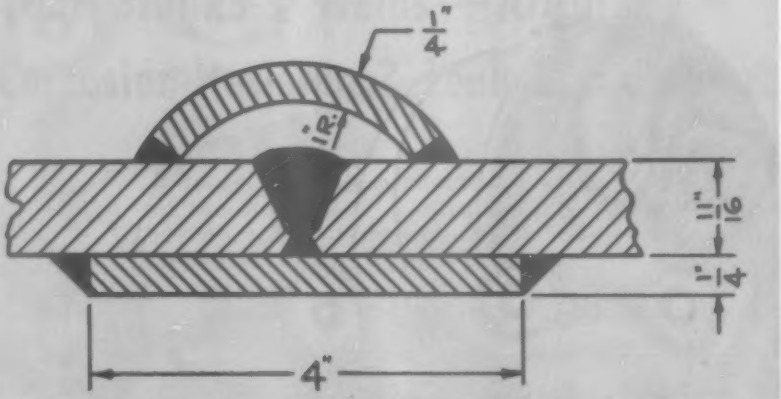
Use Extra-Low-Carbon Stainless

After exhaustive tests, at the AEC Laboratories, the choice of materials for these tanks was designated as stainless steel Type 316 ELC, with carbon content held down to 0.03% maximum. All plates, pipe and bars were required to meet this chemical analysis, and were given a solution annealing and pickling following their rolling at the mill. As an added measure of control, a sample of each heat of all materials was subjected to corrosion evaluation by means of the boiling nitric acid test in accordance with ASTM A-262-52-T Specification. Only material having a maximum average corrosion rate of 0.0025" per month for five 48 hour periods was acceptable.

Double Butt-Welded Seams

Since properties of the welds and areas adjacent to the welds, both chemically and physically, must match that of the original approved material, this part of the contract received most attention. The double butt-welded seams were made by the shielded inert gas metallic arc method employing a consumable electrode of Type 316 ELC, shielded on the welding side with argon gas, and with helium gas on the opposite interior side (delivered through a movable water cooled back-up shield).

The importance and advantages of this method of welding is the total absence of flux and other impurities from the molten de-



All longitudinal and circumferential welds were reinforced with ¼-inch thick stainless steel bars to provide additional life extension factor for tanks.

posited metal, thus producing a cleaner weld, free from porosity. The arc does not pick up carbon, and the loss of chromium and nickel is negligible. The tungsten electrode utilized also permits higher than average welding currents, which results in greater heat concentration in a small area. The 11/16" thick plate joints were thus completed in five passes.

Thorough Cleaning Before Welding

Prior to the fit up and welding of the joints, the edges to be welded were thoroughly cleaned to remove all foreign matter and degreased to remove all oil or other hydrocarbons. This treatment was applied to an area at least 1½" on each side of the weld joint.

Before the start of welding, Alloy Fabricators were asked to submit their recorded welding procedure as approved by an authorized insurance company. Only welders so qualified under this procedure were permitted on this job. And, as a final check on the quality of our welds, we prepared deposited weld metal coupons for corrosion evaluation by a recognized independent testing laboratory. Using the same boiling nitric acid test applied to the materials at the mill, the deposited weld metal was acceptable only if it did not exceed a maximum corrosion rate of 0.003" per month for five 48 hour periods.

Not fully satisfied in the use of 11/16" thick plates (pre-determined to provide an assumed life of the equipment) and in the strict investigations, welded coupons representing the longitudinal seams of each tank and of the internal pipe coil welds, were prepared (as a continuation of the production

(Continued on Page 98)

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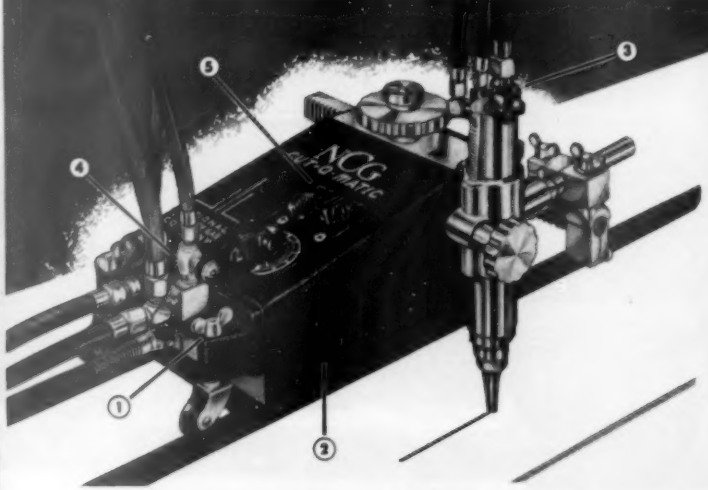
More Accurate, Lighter Weight

NEW CUT-O-MATIC® NO. 7

PORTABLE FLAME-CUTTING MACHINE



1 New torch stabilizing device brings new cutting accuracy—A new, unique *floating rear caster* assembly practically eliminates machine wobble and side tilt, when passing over rough, unevenly surfaced plate. Gives production-line accuracy, clean, smooth edges, no finishing.

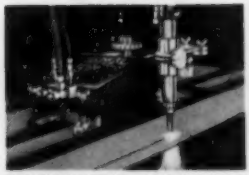
2 New design cuts 20 lbs. off weight—Almost unbelievably, this new improved CUT-O-MATIC now weighs less than 30 lbs., for ready portability, greater ease of handling—yet it's more rugged than you'll ever need.

3 New 3-hose torch now spells improved cutting efficiency—The new CUT-O-MATIC 3-hose torch has individual oxygen hose to both preheat and cutting orifice, simplifying preheat oxygen adjustment and assuring more efficient cuts.

4 New simplified Gas control—A new valve block assembly now locates preheat controls on machine, separated from high pressure oxygen control on the torch. Adjustments on preheat now made freely without disturbance to oxygen control.

5 New switch is maintenance-free for life of machine—New rotary-type switch, exclusive with NCG, provides trouble-free starting, stopping and reversing for life of machine. Has silver electrical contacts, is permanently sealed against grit and dirt.

CUT-O-MATIC has been redesigned throughout, offers many more advantages than those mentioned here. No other portable flame-cutting machine like CUT-O-MATIC. Get proof, the full story. Ask for a demonstration or write for new big broadside from any authorized NCG dealer or nearest NCG office or address below.



Straight Line Cutting—A 5-foot section of rigid track is supplied with each machine. By using two lengths progressively, a straight cut of unlimited length can be made in one continuous operation.

Bevel Cutting—Straight or circle cuts can be made to any bevel angle by a simple adjustment of the **Cut-O-Matic** torch holder.

Circle Cutting—True circles and arcs, 3 inches to 60 inches in diameter with either square or bevel edges, are cut easily by attaching the radius rod assembly furnished with each machine.

Stack Cutting—Where many pieces of the same dimensions are needed, stack-cutting with the **Cut-O-Matic No. 7** provides real production line economies. Simply clamp plates as shown and use larger size cutting tip.

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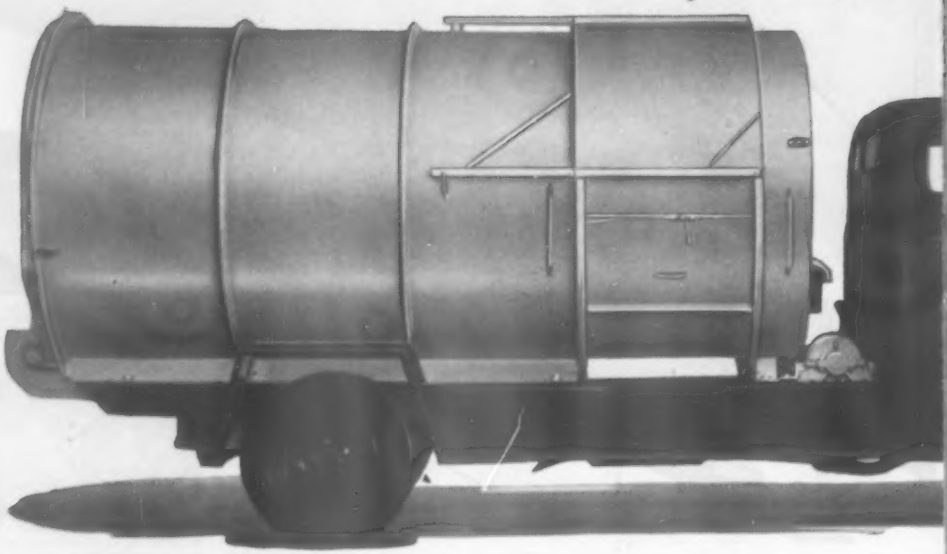
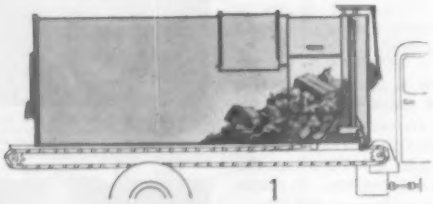
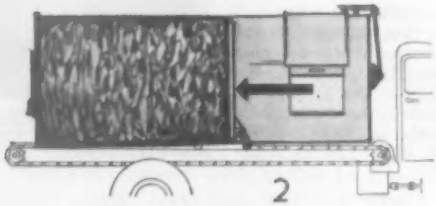
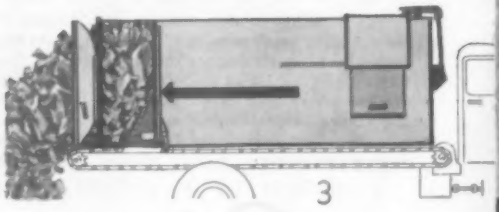
Welds withstand 50,000





Here's the Pak-Mor refuse collection unit . . . welded throughout with A. O. Smith SW-85 electrodes. Front panel opens for loading. Packer plate not only compresses the load but also serves to discharge the *complete load* through the rear hatch.





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They're made with A. O. Smith SW-85 electrodes . . . serve on ingenious Pak-Mor refuse collection units

A. O. Smith SW-85 electrodes are used *exclusively* in the building of unique all-welded Pak-Mor refuse collection units. Welds must *continuously* withstand a force of 50,000 lbs. exerted by a heavy-duty packer plate.

Pak-Mor selected SW-85 electrodes because of high tensile strength and durability. They are also pleased with easy handling in all positions — vertical, horizontal or flat. The SW-85 scores high with welders . . . is versatile in clean-up as well as production . . . readily adaptable to both a-c and d-c welding.

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The man from A. O. Smith

Grant Annable introduced Pak-Mor management to the SW-85 electrode. Like all A. O. Smith welding salesmen, Grant is always ready *and able* to help solve welding problems.

Everything for welding is yours from A. O. Smith!

Welding is now *(and always has been)* our full-time business. We offer you America's top line of electrodes . . . welder-proved equipment and accessories . . . everything from a-c and d-c welding machines to helmets and tools.

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Milwaukee 1, Wisconsin
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When welding H-sections make sure they are placed on stands with web vertical as shown (left).

Cost of structural welding can be minimized by good accessibility. It helps operator weld in proper position and permits him to see work clearly (right).

Labor costs can be reduced and strength increased if structural steel joints are designed so welds can be made in one pass (below).

Do's and Don'ts

HINTS FOR DESIGNERS

1. Specify minimum amount of weld that will satisfy governing conditions. Do not overweld.
2. Do not use "all-around" symbol indiscriminately.
3. Keep welded joints simple. Design for downhand welding when possible.
4. Design joints for welding. Do not design them for riveting and then note to be welded.
5. Consider standard mill tolerances of rolled shapes and effect they may have on detail.
6. Do not use details which depend on rolled shapes being perfectly square and to exact dimensions.
7. Do not use both direct butt weld and a splice plate on the same joint for the same purpose. Use one or the other.

for Welding Structural Steel

by **CHARLES I. ORR**
Assistant Chief Engineer,
Consolidated Western Steel Div.,
United States Steel Corporation

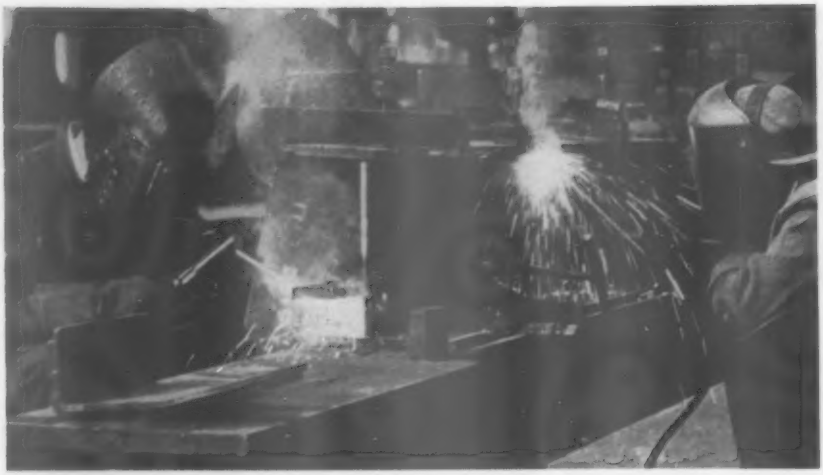
IN welded steel construction, it is quite possible that welding processes are further advanced at this time than the know-how of structural steel design. This, despite the fact that design is the most important of all components going into welded structures.

There is a substantial difference between designing for a riveted or bolted job and for a welded job. Due to the lack of standardization for welded joints, drawings for a welded structure must show more complete information to assure execution of the work in a manner visualized by the structural engineer.

Not long ago the Committee on Welding Practice of the Structural Engineers Association of Southern California prepared a report which recommended that specific details be provided for each connection, showing the size of all detail material and of welds. This can often be simplified by use of job standard details together with accompanying schedules.

They also suggested a series of basic rules for guidance in the preparation of design drawings. They pointed out the need to specify the minimum amount of weld that will satisfy governing conditions; that over welding should be avoided; that the "all-around" symbol should not be used promiscuously; and that, where feasible, design should be aimed at downhand welding.

The committee further recommended that joints be designed es-



Structural steels with best weldability should be used. However, all available types of structural steels can be welded satisfactorily if proper procedures are used.

pecially for welding—not designed for riveting and then welded. The need to take into consideration the standard mill tolerances of rolled shapes was also pointed out, and that it is not correct to depend upon such shapes being perfectly square and to exact dimension. They observed that it is not necessary to use both a direct butt weld and a splice plate on the same joint for the same purpose. One or the other should be used.

Keep Welding Details Simple

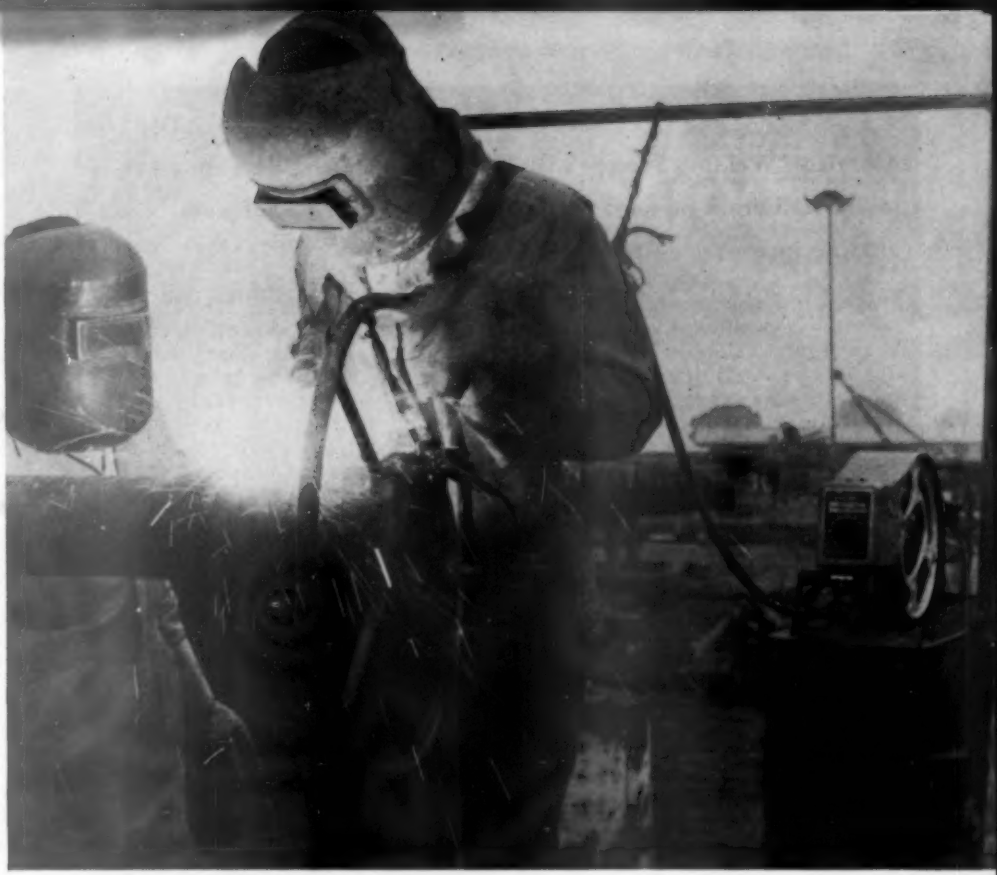
In the interest of economy, welded details should be kept as simple as possible. Gusset plates, splice plates, and similar fittings are usually not necessary. Parts should be designed and detailed so as to provide good accessibility for fitting, and for performing the welding with electrode in the proper position, and so that the operator can see his work clearly.

The relative size of welds is also a major economic consideration. A $\frac{5}{16}$" fillet weld can be made with one pass. A $\frac{3}{8}$" fillet weld requires two passes or almost twice as much labor and 40% more weld metal, but is only 20% stronger than the $\frac{5}{16}$" fillet weld.

The welded base plate provides a typical example of welded construction and is all too often subjected to the common sin of overwelding. Base plates are welded to column shafts to resist calculated moment, shear, or uplift—or a combination of these factors—or just to stick the column in position so that it won't be misplaced. The weld required for any of these, except perhaps the last one, can be calculated. However, it is much easier to call for a weld of generous size and add a little circle to the symbol which says "weld all around."

No Need to Double Weld Size

The base plate for 8 WF 31 may be held securely welded in place by a minimum of four 2-inch welds, whereas, the total dimension "all



Semi-Automatic Tool Joint Hard-Facing

FOR HIGH SPEED AT LOW COST

In some areas where formations and drilling conditions do not subject the string to severest abrasive wear, it has been found that tool joints may be hard-faced satisfactorily with a high alloy material other than Tube Borium (tungsten carbide). Or, in the case of a severely worn string that doesn't justify the cost of tungsten carbide tool joint rebuilding, a less expensive alloy may do an adequate job.

In such situations the new Stoody 100 fabricated tubular wire (same analysis as Coated Tube Stoodite) applied by the semi-automatic welder provides the best answer yet.

With this new process, welding is FAST, at the rate of 12 to 15 pounds per hour; *four times that of manual application.* Abrasion resistance of this alloy is HIGH. Heat input is LOW. And the material cost is moderate. Semi-automatic welders are modestly priced but result in enormous savings in welding time.

Standard semi-automatic welders are readily adapted to the feeding of Stoody wires; only minor modifications are required—feed rolls and a simple nozzle are usually the only changes necessary.

Your Stoody dealer is prepared to give you complete information and literature on the Stoody semi-automatic wires now available for all welding purposes. Look him up in the yellow pages of your telephone book or, if more convenient, write directly to the company.

STOODY COMPANY

11924 East Slauson Avenue

Whittier, California

Circle No. 36 on Reader Service Card.

"Allowable working stresses specified by American Welding Society's Building Code include an ample safety factor so there is no need to use excessive quantities of weld. Over-welding increases costs, but not quality."

around" is 48-inches. There is no more need to double the required size of the weld than there is to double the size of the column shaft or of the base plate.

Position of the weld is also important with relation to cost. In its normal progress through the shop, an H section is placed on stands with its web vertical. In this position it is simple to attach a base plate to the section by making a downhand weld on the outside of the top flange and on the inside of the bottom flange; and if necessary, a vertical weld may be made on one or both sides of the web. If welding on opposite sides of the flanges is required, either the column section must be turned over or overhead welding must be used. Both operations are relatively expensive.

Specifications Can Be Simple

Specifications can usually be quite simple. The "Standard Code for Arc and Gas Welding in Building Construction" of the American Welding Society is almost universally accepted and can be incorporated in the specification by reference. A. W. S. "Specifications for Welded Highway and Railroad Bridges" may also be incorporated by reference when applicable. Certain sections of this specification may apply to structures other than bridges when such structures are subject to dynamic or vibratory loading.

Job specifications should also list the qualifications of or additions to the A. W. S. specifications previously mentioned. For instance, either specifications or the drawings should definitely state whether butt welds are "incomplete penetration" or "complete penetration" and should specify definite inspection requirements. Specifications should not impose unnecessary or impractical restrictions relative to materials, procedures or inspections.

Discuss Material Specifications

Material specification has been a subject of considerable discussion. By far the greater percentage of steel used in structures for many years has been produced under A. S. T. M. specification A-7. Practically all building codes require that structural steel conform to this specification which does not provide a maximum limit for carbon content. Since steel becomes progressively more difficult to weld as the carbon content increases, this is a definite matter of concern to engineers and welding technicians.

Limits on Carbon Content

Federal Specification QQ-S-741 Type 11 steel provides for a structural steel with definite maximum limitations of carbon content and is ideal for use in welded construction. This specification was revised and simplified in 1952 and reissued as Tentative Specification QQ-S-00741. In 1954, A. S. T. M. issued Specification A373-54T, which is essentially the same as

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QQ-S-00741. Therefore, we now have a standard specification for steel designed especially for welded structures.

Although these later specifications offer technical advantages, they sometimes create problems with respect to the availability of steel. Because of the great variety of shapes and sizes of members required for steel structures, it is difficult for the fabricator or warehouse to maintain adequate inventories under one specification.

Mill Ordering Is Problem

Since it is reasonable to assume that local stock will, in general, be limited to A-7 steel and that steel under specification QQ-S-00741 and A373-54T must be mill ordered, the use of these specifications should be limited to steel that can be mill ordered, that is, with respect to the time element and minimum quantities.

The design engineer must have confidence in the method of connection he specifies. Repeated tests and the performance of structures has shown that the normal welded joint is stronger than the base material. It is reasonable to assume that good welding will be obtained when sound regulations such as contained in the A. W. S. Building Code are followed by a competent organization. The allowable working stresses, specified by code, include an ample factor of safety so there is no need to use excessive quantities of weld metal.

The carbon content of A-7 steel in members less than one inch thick is normally within the maximum limits required for optimum weldability, and it is quite possible to make satisfactory welded joints with steel of higher carbon content

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if proper procedures are used. Consequently, it is still desirable to use A-7 steel for "out of stock" jobs. The minimum tensile strength of 60,000 p.s.i. specified in A-7 is reduced to 58,000 p.s.i. in QQ-S-00741 and in A373-54T and the minimum yield point is reduced from 33,000 p.s.i. to 32,000 p.s.i.

It is assumed that building departments will approve this slight reduction in ultimate strength without requiring a reduction in working stresses.

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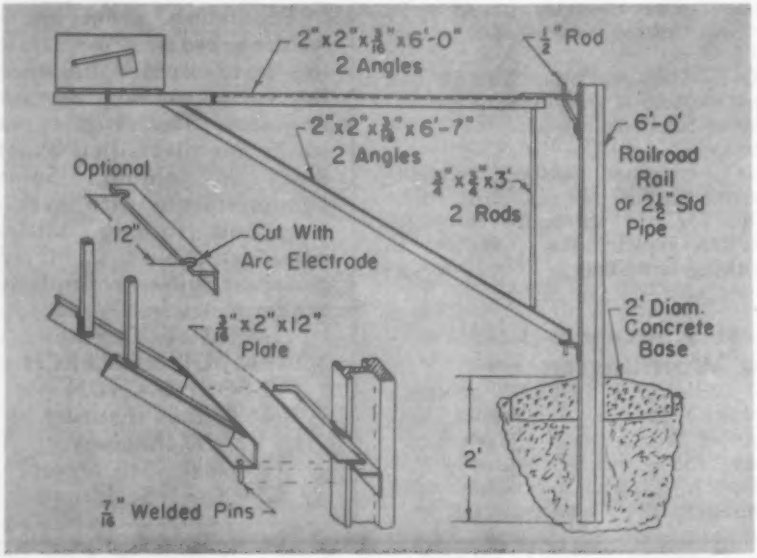

Welded Mailbox Post Is Damage-Proof

POSTS supporting rural and suburban mailboxes are often damaged by highway maintenance equipment or vehicles on the highway. Kenneth Osborn, Loveland, Calif., overcame this problem by arc welding the bracket shown here.

The post, which sets 6-feet back from the highway, is a 6-foot piece of railroad rail set in concrete. The box is attached to the outer end of a bracket built from discarded bed rails. The upper end of the vertical member of the bracket hinges freely on a ½-inch mild steel rod which is part of a supporting bracket welded to the post.

At the bottom, the bracket has a horizontal angle iron cross-member about 14-inches long. This angle iron has two welded pins, about 7/16-inch diameter, placed 12-inches apart along the underside, projecting downward.

A similar angle iron was welded to the post. However, it has two notches in which the pins rest. This permits the mailbox support to swing either way, but still return by gravity to its proper position. This mailbox bracket has proven satisfactory and is highly recommended by highway officials.

Adapted from "Projects in Metal", published by James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

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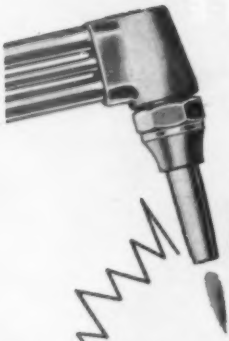

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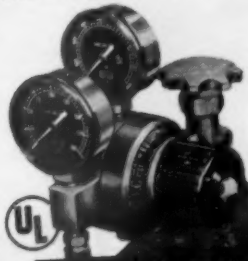

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This is the fourth part of an "ABC" series which gives comprehensive practical information on each of the basic resistance welding methods. Here are "step-by-step" instructions on . . .

How and Where To Use SEAM WELDING

SEAM welding is a resistance welding process in which welds are made lineally between two contact rollers, or a contact roller and a contact bar. In other words, a series of overlapped spot welds is made; overlapping is controlled by the timing and speed of rollers. When spots are not overlapped enough to produce gas tight welds, process is "roller spot welding."

Synchronous Interrupted Timing

Use of synchronous interrupted timing is preferred for most seam welding applications, because it controls heat effect and allows each spot in the seam to cool under pressure during off time. This method produces less distortion and warpage and retards the tendency of heat to build up ahead of the welding wheels. Synchronous timing also gives better control over surface disturbances caused by coating or poor steel.

Non-synchronous or continuous timing can be used on mild steel up to and including 20 gauge, with speeds of 30 ipm maximum. Slower speeds can be used at lower current values. Heavier gauges can be welded, but surface conditions become acute and wheel life is short.

Determine Flange Width

Flange or lap should be at least 6 times the thinnest gauge used. For example, .050-inches times 6 equals .300 lap. Weld width is about 80 percent of wheel width.

Material welded should be pickled rather than sand or grit blasted. It should be clean, free from rust and oxides. Hot rolled scaly stock is unsatisfactory, resulting in poor welds and necessity for increased wheel maintenance. Coated steel, such as galvanized, zinc and terne plate, can be welded successfully.

Material should be formed properly for best results. *Do not use the welder for cold forming operation.*

Wheel width is controlling factor for proper welds. As gauge increases, weld wheel width increases. This eliminates excessive

SEAM WELDING MILD STEEL

The following data is to be used for continuous welding without an interrupter. Maximum speeds are shown:

Gauge Thick	Speed per Minute in Inches	Secondary Amperes	Wheel Pressure In Lbs.	Weld Width	Wheel Face Upper	Wheel Face Lower
24 (.024)	392	14000	600	3/32	1/4"	1/4"
22 (.029)	392	14750	600	3/32	1/4	1/4
20 (.038)	392	18000	600	7/64	1/4	1/4
19 (.044)	300	19100	800	7/64	1/4	1/4
18 (.050)	220	20500	1200	7/64	1/4	1/4
16 (.063)	220	22000	1400	1/8	1/4	3/8

All wheel diameters used were approximately 8". The gauges shown above can be welded continuously at lower speeds in which case the current values will be lower.

For high speed welding, we would recommend welding without an interrupter up to and including 20 gauge. The heavier gauges shown above can be welded, however, but surface appearance is poor, and we recommend that for best results synchronous timing should be used.

Material Thickness **Ga.	Material Thickness Inch	Spots Per Inch	Welding Speed In/Min	Timing Sched. Cycles On	Timing Sched. Cycles Off	Welding Current Amperes	Press Pounds	Welding Wheel Dia.	Wheel Face Width
24	0.025	12.5	96	2	1	11,700	550	8"	5/32"
22	0.031	12.5	48	3	3	10,800	600	8"	5/32"
22	0.031	12.5	96	2	1	12,200	600	8"	5/32"
22	0.031	12.5	144	1	1	15,700	600	8"	5/32"
20	0.039	12.5	48	3	3	12,300	600	8"	3/16"
20	0.039	12.5	48	4	2	11,500	600	8"	3/16"
20	0.039	12.5	96	2	1	15,000	600	8"	3/16"
20	0.039	12.5	144	1	1	20,200	600	8"	3/16"
18	0.049	12.5	36	4	4	13,000	750	8"	7/32"
18	0.049	12.5	36	2	2	17,600	750	8"	7/32"
18	0.049	12.5	72	3	1	15,000	750	8"	7/32"
18	0.049	11.1	108	2	1	19,000	750	8"	7/32"
16	0.062	12.5	36	4	4	15,400	750	8"	1/4"
16	0.062	12.5	72	2	2	20,700	750	8"	1/4"
16	0.062	11.1	108	2	1	21,400	750	8"	1/4"
14	0.078	12.5	24	6	6	15,100	900	8"	1/4"
14	0.078	9.4	48	4	4	18,600	900	8"	1/4"
14	0.078	12.5	72	3	1	21,300	900	8"	1/4
12	0.109	12.5	24	6	6	17,400	1000	8"	9/32
12	0.109	8.3	48	5	4	20,000	1000	8"	9/32"
12	0.109	12.5	72	4	2	22,700	1000	8"	9/32"
11	0.125	12.5	24	6	6	20,800	1200	8"	5/16"
11	0.125	8.3	48	4	5	26,300	1200	8"	5/16"

Note:—The above tables indicate practical production methods for various thicknesses of steel. However, other combinations can be used, depending entirely on manufacturing conditions of articles to be welded.

To Find Seam Welding Wheel Speeds

1. Find diameter of wheel that is driven.
2. Multiply diameter x (3.1416)
3. Find time in seconds of 1 wheel revolution.
4. Find welding speed in minutes.

Example

1. 8"
2. $8. \times 3.1416 = 25.1"$
3. 20 seconds
4. $25.1 \times \frac{60}{20} = 75.3"$

Answer: 75.3 inches per minute.

STAINLESS STEEL SEAM WELDING DATA

Thickness	Spots per inch	Speed per minute	Pressure	Timing On	Timing Off	Current Pri.	Current Sec.	Wheel Width
*.005	—	30	650	1	5	—	12500	1/8"
*.020	—	30	900	2	3	—	8640	1/8"
.022	10	72	926	1	4	209	6640	5/32"
*.025	—	72	750	2	2	—	6300	3/16"
.035	10	60	1000	2	4	327	7500	3/16"
*.035	10	60	1000	2	4	—	7500	3/16"
.049	10	36	1165	3	7	374	8600	1/4"
*.049	10	36	1150	3	7	—	8600	1/4"
.055	10	30	1300	3	9	468	10764	3/8"
*.082	10	30	1400	3	9	—	9500	3/8"
.074	10	24	1450	4	11	406	9330	1/4"

*Resistance welding manual Page 115 R.W.M.A.

unit pressures and unit current density. Wheels should have at least 75 percent conductivity, a hardness of 76 Rockwell B, a tensile strength of 55,000 psi and 15 percent elongation.

Cooling water should be as cold as possible and used profusely. This improves weld quality and retards wheel wear. Plenty of water retards warpage and minimizes surface burning, wheel pickup. Use a 5 percent borax solution to prevent rust.

Gas Tight Welds

Spots per inch must increase as stock thickness decreases in order to consistently obtain gas tight welds. To produce such a weld in light and heavy gauges, 12 to 8 spots per inch should be used, respectively, with speeds of 12 to 24 inches per minute.

Spots per inch are found by multiplying cycles per second (60) by number of seconds in a minute (60) and dividing the sum (3600) by the sum of off and on time in cycles (for example, 2 plus 2). In other words, 60 times 60 equals 3600 divided by four or 900. This figure is the number of inches per minute and is divided by 60 to get 15 spots per inch.

Welding, speed, spots per inch and timing schedule are dependent upon each other, so it is necessary to establish two of these values, before the third can be determined. Since spots per inch value follows a definite relation to the thickness of stock, it should be the first to be established.

Here's how to find welding speed when spots per inch and timing are known. Number of spots per minute is calculated as previously shown and is divided by the number of spots per inch. For example, 900 ipm divided by 13 spots per inch give 69.2 spots per minute.

Timing Is Important

For mild carbon steels, "on" and "off" time should never exceed three times the other. In most cases best results are obtained with equal on and off time. The on time is determined largely by the thickness of stock, while the off time is determined by the welding speed. The thicker the stock the longer the on time, while the faster the welding speed, the shorter the off time.

Here's how to find total on and off time to produce gas tight weld,

if inches per minute and spot per inch are known. Multiply cycles per second (6) by seconds in a minute (60) and divide the result (3600) by the sum of inches per minute weld speed (60) times spots per inch (13) or 780. Answer, 4.6, is rounded off at 5.

Welding Current

Proper welding current is so dependent upon other conditions that it is not practical to give any formula for determining it. For example, the amount of cooling water applied to the wheels change the current requirements. The shorter the on time, or the faster the speed, the more current required. All other variables must be established first, and then current determined by trial and error.

What About Pressures?

Welding pressures used for seam welding are basically static pressures calculated by head weight and cylinder size. It is important that the method of applying pressure be reliable, rather than to have a low inertia head with erratic applied pressures. Pressures for seam welding are slightly higher than for spot welding.

Mash Seam Welding

Mash seam welding can be used in place of flash welding and trimming. Lap should be 1½ times thickness of one sheet. Weld wheel should be twice to two and one-half times the width used for standard seam welding. Pressure should be about 3 times higher than for seam welding. Continuous timing can be used. Final mash weld thickness is about 25 percent greater than the original one sheet.

Seam Welding Various Metals

Procedures for welding coated steels and settings used are not different than those for mild steel. Pressures are slightly higher with slower speeds; currents are also slightly higher.

Welding of these materials with the low melting coatings presents some difficulties because coating alloys adhere to wheel face and increases maintenance problems. Use of a proper knurl drive is desirable to help break up the coatings.

Pressures are about 75 percent greater when welding stainless. Currents are about 50 percent less. Welding speeds are much slower. On time should be short to prevent carbide precipitation. Off time is 2 to 3 times more than on time.

Seam Welding Aluminum

Seam welding of aluminum is difficult. Conditions have to be held constant in order to get good welds. Cleaning of aluminum is of foremost importance as wheel pickup and poor welding results if cleaning is slipshod. Wheels should have an angle of 7° to 11° and a one to two-inch radius. This concentrates current at the weld. Water cooling is also very important. Water flow of 2 to 3 gallons per minute is required to minimize pickup and heat conduction.

Synchronous timing is definitely needed, because aluminum is critical to any differentials. Speeds range from 1" to 5 inches per minute, 25 spots per inch for .010, 7 spots per inch on .125.

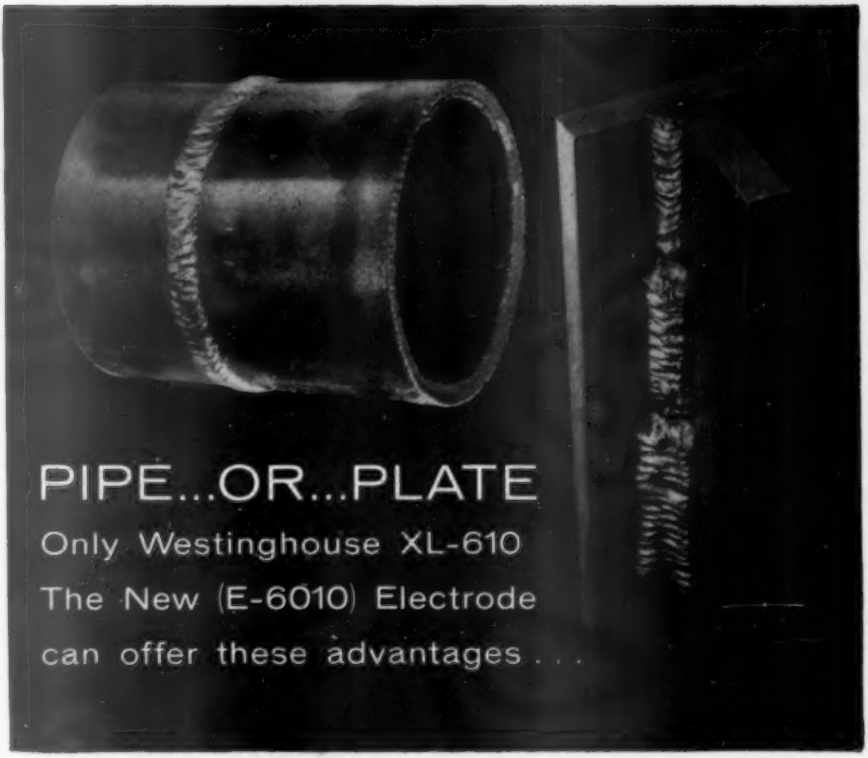
On time is short — off time is 3 times greater than on time. Excessive speed increases pickup.

Pressure is 15 percent greater than for mild steel.

Current used ranges from 20,000 to 45,000 amps for .010 to .125 stock.

Low inertia head should be used.

Material presented here was prepared by engineers at Federal Machine and Welder Company, Warren, Ohio.



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Ultimate strength, psi . 62,000	65,900	64,500	62,400

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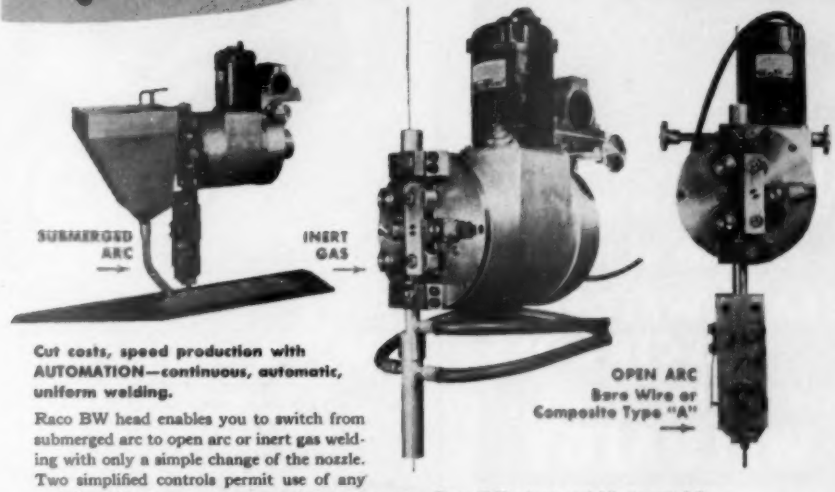
NEW LINE OF CABLE SPLICING TAPES for use with standard steam or electric vulcanizers has been developed by Okonite Company. Known as Okonite Vulcanizer Tapes, complete line include rubber insulation, rubber sheath and colored neoprene sheath tapes that apply and vulcanize easily into void-free splices equal mechanically and electrically to cable itself. Tapes are supplied in standard one-inch-width. **Circle No. 108 on Reader Service Card.**

A NEW LINE OF AGGLOMERATED FLUXES for automatic submerged arc welding of low alloy steels has been introduced by Lincoln Electric Co. Individually compounded for each job, fluxes contain alloying elements which may be changed as required. These new alloy fluxes can be used with a mild steel electrode and will produce a low alloy deposit which can be readily varied. Fluxes can be compounded to produce weld metal containing varying amounts of chromium, molybdenum, vanadium and nickel. **Circle No. 109 on Reader Service Card.**

TEMPERATURE INDICATING CRAYONS, PAINTS AND PELLETS made by Tempil Corp. are now being labeled with both the Fahrenheit and Centrigrade temperature ratings. This was done to meet requirements of expanded laboratory use and for foreign trade where the Centrigrade scale prevails. **Circle No. 110.**

70% Faster Welding *with*

NEW RACO BW "3 IN 1" AUTOMATIC HEAD



Cut costs, speed production with AUTOMATION—continuous, automatic, uniform welding.

Raco BW head enables you to switch from submerged arc to open arc or inert gas welding with only a simple change of the nozzle. Two simplified controls permit use of any variable voltage or constant potential power source. Raco BW adapts quickly to any job . . . nozzle can be positioned 360° in two planes. Duplex nozzles and feed rolls available for twin arc-welding.

Use RACO Automatic Wire for Smooth, Trouble-Free Operation

Whether you buy in coils or on spools, you'll find all grades to fit your needs at Reid-Avery. Threadwinding and careful reduction to finished size assure straight line feed off. Uniform weight guaranteed. All coils boxed and palletized at no extra charge.

LAYER WOUND COILS 25-lb. to 800-lb. Perfectly wound on corrugated steel band core.

WOODEN SPOOLS to fit all popular makes of MIG welding machines.

FAST DELIVERY ON ALL GRADES

Mild Steel . . . Hi-Tensile, 1% Mn . . . Hi-Mang, 2% Mn . . . Lo-Mang-Moly . . . Hi-Mang-Moly . . . Chrome-Moly . . . Low-Alloy Hi-Tensile . . . Stainless Steel—All grades . . . Aluminum—43S, 54S, 56S . . . Non-Ferrous Alloys . . . Hi-Temperature Alloys . . . Special Hi-Tensile for MIG

DISTRIBUTORS FROM COAST TO COAST

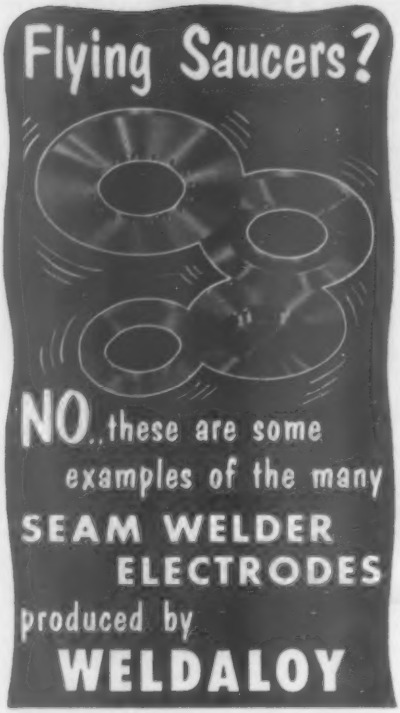
Tell us of your welding problem . . . write today for assistance from our experienced WELDING ENGINEERS!

The REID-AVERY COMPANY Inc.

BALTIMORE 23, MARYLAND

SINCE 1919 PRODUCERS OF ARC-WELDING ELECTRODES AND WELDING RODS

Circle No. 44 on Reader Service Card.



Maybe not tomorrow . . . but when the fabrication of flying saucers does start, Weldaloy Seam Welding Wheels will be alloyed to do the job.

Right now, Weldaloy Seam Welding electrodes of any size are available in high conductivity, high strength alloys. Several sizes of seam welding wheel blanks are carried in stock. Shafts or bushings for seam welding machines are also supplied regularly by Weldaloy.

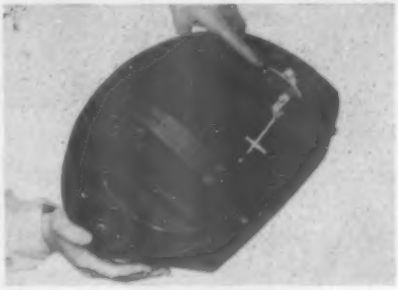
Complete Weldaloy Products manual available on request. No obligation. Write TODAY!

WELDALOY PRODUCTS CO.
25753 Groesbeck Highway
EAST DETROIT, MICHIGAN

Circle No. 45 on Reader Service Card.

Chin-Controlled Helmet

A new-type welding helmet "Chin-Lens" that frees both hands for welding at all times by permitting the operator to raise or lower the welding lens with a slight pressure of the chin is now



available from Carruthers and Fernandez, Inc.

The compact helmet features a patented chin pad that requires only a quarter-inch motion of the chin to drop the welding lens, giving complete visibility through the clear inside safety glass and filter lens. Removal of the slight pressure instantly returns the welding lens to its welding position. The helmet also allows the operator to start his arc in only five seconds instead of twenty seconds required when using the standard helmet, and enables the welder to get to his work in tight quarters leaving hands completely free at all times.

Circle No. 111 on Reader Service Card.

Low Hydrogen Hard Facing

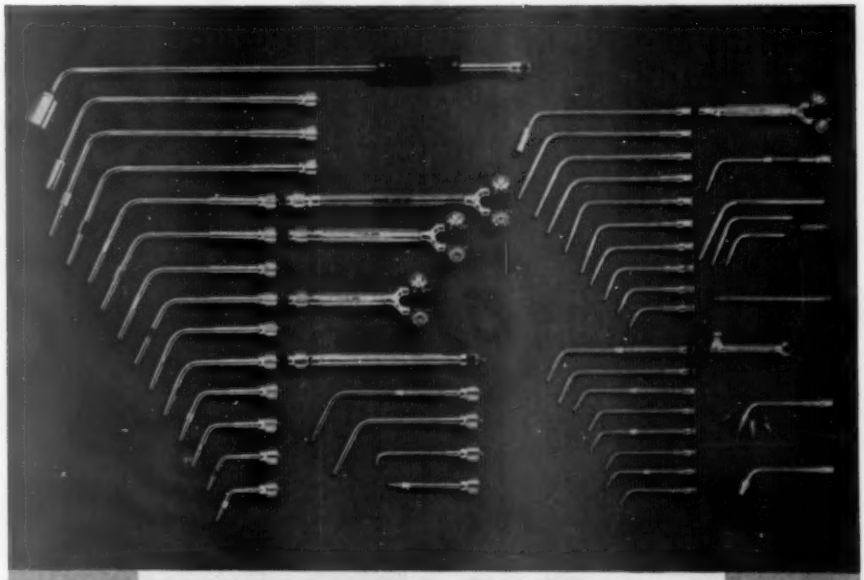
A new low hydrogen hard facing alloy for use on working surfaces of heavy-duty construction, mining and aggregate handling machinery and equipment is now available from Wall Colmonoy Corp. Known as Colmonoy No. 2, the new iron base chrome-moly-silicon alloy is available for general application to manganese and other steels in the form of AC/DC electrodes.

Electrode is said to provide high abrasion and impact resistance, but is not recommended where crack-free deposits are demanded. Welding properties include low spatter loss and excellent fluidity.

As deposited build ups have a Rockwell hardnes of 50-55 C scale following first pass and 55-60 after second pass. Tensile strength is about 75,000 psi.

Colmonoy No. 2 is available in various diameters and is packed in 10-lb. metal containers.

Circle No. 112 on Reader Service Card.



Fit the flame to the job with VICTOR nozzles and tips

Why lose time and waste gas with a "misfit" flame? Start *right* with a Victor torch, match the flame to *any* job with Victor interchangeable nozzles and tips. Victor torches that "grow with the job" cost no more, pay you plenty in faster, better work. See them at your Victor dealer's today, or write *now* for catalog.

VICTOR for welding

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

844 Folsom St.
San Francisco 7

3821 Santa Fe Avenue
Los Angeles 58

Circle No. 46 on Reader Service Card.

THE MOST ADVANCED AUTOMATIC FLUXING SYSTEM EVER OFFERED FOR BRAZING

EASY WAY TO LOW COST

• All-State "Jet Flux" Auto-Dispenser No. 1 as you get it from the factory . . . is a pressure cylinder complete with automatic dispenser, controls, and hose with connections . . . ready to tie in, without special tools, to single or multiple brazing stations.

• Only one supply item — All-State "Jet Flux" — fluxes brazing work automatically through the fuel gas.

Ask to see "Jet Flux" Demonstrated by your Distributor

Folder "Way to Lower Brazing Cost" on request.

A-S DISTRIBUTORS EVERYWHERE

All-State

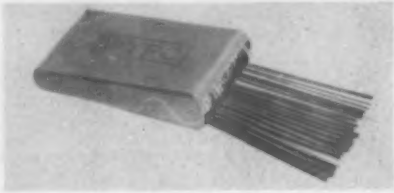
ALL-STATE

WELDING ALLOYS CO., INC.
White Plains, N. Y.

Circle No. 47 on Reader Service Card.

New Large Size Tip Cleaner Kit

Designed for greater convenience, a new master set of Wypo tip cleaners has been developed by Maitlen & Benson, Inc. The new set contains all sizes of cleaners found in both standard and jumbo sets, putting all 21 sizes of tip



cleaners at operators' finger tips. The company will continue to make both the Standard Set of 12, which cleans 27 drill sizes, Nos. 75 to 49 inclusive, and the Jumbo Set of 9, which cleans 19 drill sizes, Nos. 48 to 30, inclusive.

All cleaners incorporate exclusive design feature which is said to provide as many as 60 more cleaning edges per inch of cleaner. Straight sided valleys assure thorough cleaning.

Circle No. 113 on Reader Service Card.

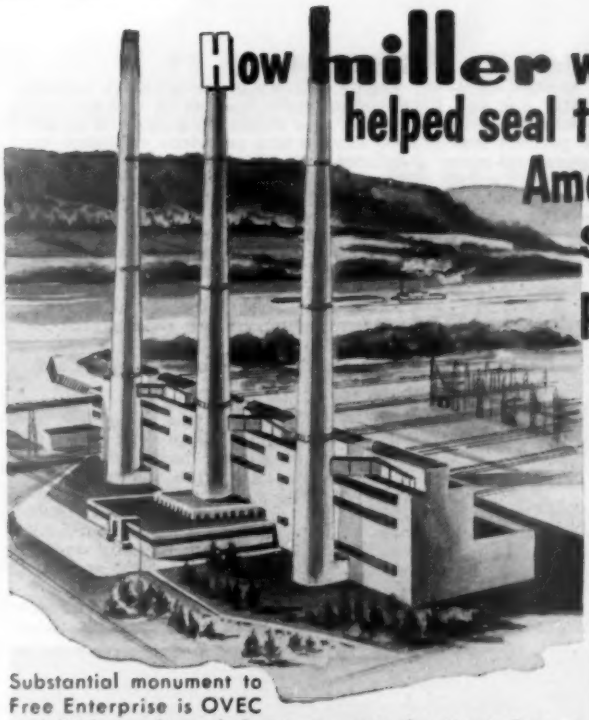
Aluminum Welding Cable

A new, lightweight aluminum welding cable, called Tweco-Lite, has been announced by Tweco Products Co. Weighing half as much as copper cable, new

cable also has greater flexibility, according to manufacturer. Made in Grade "SR", which has synthetic rubber jacket, and Grade "N-60", which has 60 percent Neoprene jacket reinforced with rayon braid, cable is packaged in pre-cut 50 and 100 foot lengths. It is also available in 250 and 500 foot coils and 1,000 foot reels.

Circle No. 156 on Reader Service Card.

How miller welders helped seal the arteries of America's largest single purpose power plant...



Substantial monument to Free Enterprise is OVEC and IKEC, suppliers of electric power to the Atomic Energy Commission's new uranium diffusion center in Pike County, Ohio.

Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, agreed to supply electric power to this great new atomic production center . . . *15 billion kilowatt-hours annually.*

Miller Selenium Rectifier d-c Arc Welder, in four wide-range models. For complete, concise, worthwhile information on these and other Miller Arc and Spot Welders, contact us today . . . at no obligation, of course.

Two huge generating stations are being built: The Kyger Creek Plant at Cheshire, Ohio will have five generating units of 200,000 KW each; Madison, Indiana's Clifty Creek plant will produce 1,200,000 KW with its six big generators. Each of the eleven turbo-generating units will operate off a single boiler, with super-heated steam reaching 1,050 degrees Fahrenheit under 2,000 lbs. pressure per square inch! The high temperatures and reheat, which the sponsor companies have pioneered in their own right, will make these two plants among the most economical, most efficient generating stations in the country.

These same elements, however, make the fabrication of faultless high-pressure steam lines vital . . . and extremely difficult. To accomplish this extremely important task, pipe welding specialists equipped with the maximum of engineering skill utilized the Miller Selenium Rectifier d-c Arc Welder.

". . . . if it's Miller, *you know* it's the *finest!*"

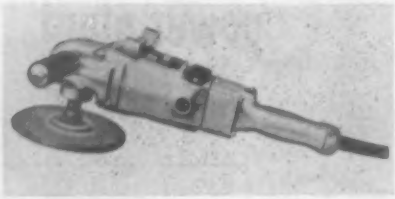
miller ELECTRIC MANUFACTURING COMPANY, INC.
APPLETON, WISCONSIN

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal, P.Q.

Circle No. 48 on Reader Service Card.

Portable Electric Sander

A new 7-inch standard sander introduced by Black & Decker Mfg. Co. possesses 20 percent more power than its predecessor yet weighs 20 percent less. Redesigned and tailored for general-purpose maintenance and production work, unit has a "cool" motor, superior balance and heat-treated spiral bevel gears for smooth constant power transmission.



Black & Decker universal motor drives sander at 4250 rpm. It weighs less than 11 pounds, is less than 18-inches long and is available for either 110 or 220 volt AC or DC operation.

Circle No. 115 on Reader Service Card.

Gas Regulators

Stable delivery of gas pressure regardless of pressure changes in the gas cylinder is the outstanding feature of the R-90 oxygen and acetylene cylinders introduced by Liquid Carbonic Corp. Regulators have all the features of the standard 2-stage regulator, but have been reduced in size so they weigh 2/3 less than a 2-stage and 1/3 less than conventional single stage. Pressure reducing unit is small self-contained capsule which can be readily changed without taking regulator out of the line and sending it out for replacement or repair.

Circle No. 116 on Reader Service Card.

Cast Iron Weld Flux

A cast iron welding flux developed by Woodward Welding Supply Co. is being used in many of the large automobile plants, according to the manufacturer. White coloring makes it easy to see impurities; heavier weight prevents flux from blowing away. The non-lumping flux is said to eliminate porosity and is claimed to be ideal for vertical application and for use on dirty surfaces.

Circle No. 117 on Reader Service Card.

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand — that's efficient welding!

Welders spend more time welding — do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP26 —an illustrated circular detailing the Specific advantages of C-F Positioners.

CULLEN-FRIESTEDT CO.

1315 S. KILBOURN AVENUE CHICAGO 23, ILLINOIS

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

Circle No. 49 on Reader Service Card.

New ARCALOY

502 LIME ELECTRODES

for x-ray quality welds

in 4 to 6% Chrome Steels

New Arcaloy 502 lime electrodes produce welds of required x-ray quality in 4 to 6% chrome steels as required for high temperature, high pressure services. Arcaloy 502 electrodes have a new lime, low hydrogen type coating, *a coating that will not fingernail*, eliminates underbead cracking and provides a basic slag with a scavenging action that consumes impurities.

The New Arcaloy 502 lime electrodes have excellent weldability *in all positions*, with an arc action smooth and stable, an easy-to-control, weld metal and slag. Arcaloy 502 electrodes conform to A.W.S. A5.4 and A.S.T.M. A298-55T Specifications, Grade E 502-15. Try the New Arcaloy 502 electrodes for x-ray quality welds in your high temperature, high pressure applications. Contact your Alloy Rods Distributor or write the plant for all the facts.

Alloy Rods Co.

no finer electrodes made... anywhere

General Offices and Plant • York 1, Penna.

Pacific Coast Sales Offices and Plant
El Segundo, California

Circle No. 50 on Reader Service Card.

Plastic Welding Gun

A lightweight, 14-ounce electric welding gun for use on thermoplastics is being marketed by Seelye Craftsmen. Equipment operates on 110 volt AC current with a choice of 180, 240 or 320 watt

elements. Welding medium is usually electrically heated compressed air, although nitrogen or carbon dioxide is used for some applications. An accurate valve controls temperature.

In addition to thermoplastics, gun can weld acrylics, styrenes and heat seal soft vinyl sheets. Special welding rod is available for polyethylene and polyvinylchloride.

Circle No. 118 on Reader Service Card.

Welding-Cutting Outfit

Ideal for small plants, farms, home shops and sheet metal plants, a new outfit for welding, cutting, heating and brazing has been developed by Dockson Corp. Known as the No. 600 outfit, unit will weld up to $\frac{1}{16}$-inch thickness and cut to $\frac{1}{2}$-inch thick. Set contains oxygen and acetylene regulators, welding and cutting torches and tips, lighter, wrench, goggles and hose with standard couplings. All parts are standard and replaceable.

Circle No. 119 on Reader Service Card.

Liquid Fluxing

A liquid flux for brazing and silver soldering has been developed by Sight Feed Generator Co. Called Rexarc Liquidflux, the boron-infused fluxing medium is vaporized, inducted into fuel gas stream automatically and passes through torch directly into flames, cleaning and fluxing parent metal. This type of fluxing is said to insure use of correct amount of flux and to eliminate after-cleaning operations usually associated with paste-type fluxes.

Packaged in individual one gallon cans and in 5 gallon cans and 50 gallon drums, Liquidflux is said to be made so that precipitation of fluxing elements in hose, torch and on work is eliminated.

Circle No. 120 on Reader Service Card.

Got Flame Cutting Problems?

Small or large . . . OHMSTEDE'S time and labor saving flame cutting machine gives you faster, easier cutting at lower cost. Here are 8 big reasons why OHMSTEDE is your best buy.

- Unlimited variety of shapes
- Wide Cutting range—cuts 42" dia. circle and straight line of 89"
- Spindle and automatic magnetic tracing
- Operates on either alternating or direct current
- Delivered with base—no extras required
- Sealed ball bearing construction
- Enclosed motor
- Low initial cost

WRITE FOR COMPLETE SPECIFICATIONS.
ASK FOR BULLETIN 42-52.

OHMSTEDE MACHINE WORKS

897-899 N. Main St. • Beaumont, Texas

Circle No. 51 on Reader Service Card.

ELECTRODES, HOLDERS, FORGINGS, CASTINGS, ALLOY ROD and BAR STOCK . . . . *For Better Resistance Welding.*

means . . .

WW SHIPS THE SAME DAY!

Service is what you can count on from WW. Many of the electrodes and holders listed in WW Catalog 14,650-4 are carried in stock. And, by means of a streamlined order-handling system, shipment is made from this stock on the same day the order is received. If there is not sufficient quantity on hand, part of your order is shipped immediately, the remainder later.

Along with this new, fast SSD service, you can continue to count on WW top quality in resistance welding materials.

WRITE, WIRE OR PHONE YOUR ORDER TODAY

W551 *WW Teletypewriter DE-1179* *Telephone TExas 4-8400*

WW **WW ALLOYS, INC.**
Division of Fansteel Metallurgical Corporation
11644 CLOVERDALE AVENUE • DETROIT 4, MICHIGAN
Home of Premium Quality Alloy Castings and Forgings

Circle No. 52 on Reader Service Card.

Welding Blowpipe

A new medium-pressure oxy-acetylene blowpipe, Oxweld W-45, has been introduced by Linde Air Products Co. The W-45, with 18 welding head sizes, 8 multiflame heating heads and 8 extensions, offers greatest welding and heating range (2 through 300 cu. ft. per hour) ever available in single manual welding blowpipe. Unit features form-molded aluminum handle, stainless steel construction and a new type locking device.

Circle No. 121 on Reader Service Card.

Plunger Toggle Clamp

Recently introduced by Erico Products Inc., the Caddy P-5 plunger toggle clamp develops 10,000 lbs. of horizontal clamping pressure. Unit features extra large pivot pins, all-welded construction, heavy steel frame and 2 11/16-inch stroke with spatter-resisting all-bronze plunger.

Circle No. 122 on Reader Service Card.

insist on famous "Jorgensen" AND "Pony"

CLAMPS

Ask your supplier

SEND FOR FREE 32-PAGE CATALOG.

ADJUSTABLE CLAMP CO.

"The Clamp Folks"

419 No. Ashland Ave. • Chicago 22, Ill.

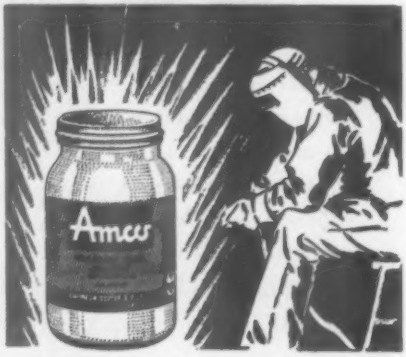
Circle No. 53 on Reader Service Card.

Amco Fluxes . . . .

FIT YOUR JOB

Assure Welding & Brazing Success

. . . EVERY TIME



You are always sure of complete oxide removal and deep penetration when you use the proper Amco flux. Why? Because Amco chemical research and development make Amco fluxes right for the particular job. Whether you're working with ordinary metals, stainless steel, aluminum, cast iron or steel . . . there's an Amco flux to assure perfect bonding.

• Consult us on all your fluxing problems •
Distributor inquiries invited

American Solder & Flux Company

Flux Manufacturers Since 1910
19th & Willard Streets
PHILADELPHIA 40, PA.

Circle No. 54 on Reader Service Card.

Power Shear

Clean cut of small angles up to 2 x 2 x ¼-inch and flats up to ¼ x 4-inches can be made by a power shear developed by Bateman Machine & Foundry Co. No grinding is necessary after cut. The shear has an attachment that will punch 3-8-inch through ⅞-inch material and a

special blade for ornamental iron work. It is equipped with a flywheel and gear drive for power with ¾-hp motor. By opening clutch, which is hand or foot operated, 44 strokes per minute may be obtained.

Unit is made of high grade cast iron with hardened clutch, clutch pin and shear blades.

Circle No. 123 on Reader Service Card.

DC Power Source

A DC power source designed to offer greatest efficiency at full load is based on a germanium rectifier and is said to provide stable voltage. Produced by Rapid Electric Co., the unit is available in capacities ranging from 300 to 50,000 amps, and offers simple controls and long life expectancy.

Circle No. 124 on Reader Service Card.

Circle No. 55 on Reader Service Card.

GLENN COMPANY — CONSTANT VOLTAGE *News Notes*

CV Welders Double Field Welding Capacity

More than a score of major U.S. fabricating firms are using GLENN CV welders to increase capacity, speed welding and reduce rejects on fabrication and erection of tanks, pressure vessels and structures.

High efficiency (85% or higher) and power factor (90%-plus) of GLENN welders is a big advantage in field welding. Input power is half that of reactive welders of comparable rating. Welding capacity of the same power source can thus be doubled—or the same welding ouput achieved with a much smaller portable generator.

GLENN CV welders are delivering outstanding performance on MIG, submerged arc, CO-2, semi-automatic, and automatic stud welding. They've licked tough control problems on 3 o'clock, roundabout and long seam welds. Why not find out what they can do for you? Write today for complete data, prices.

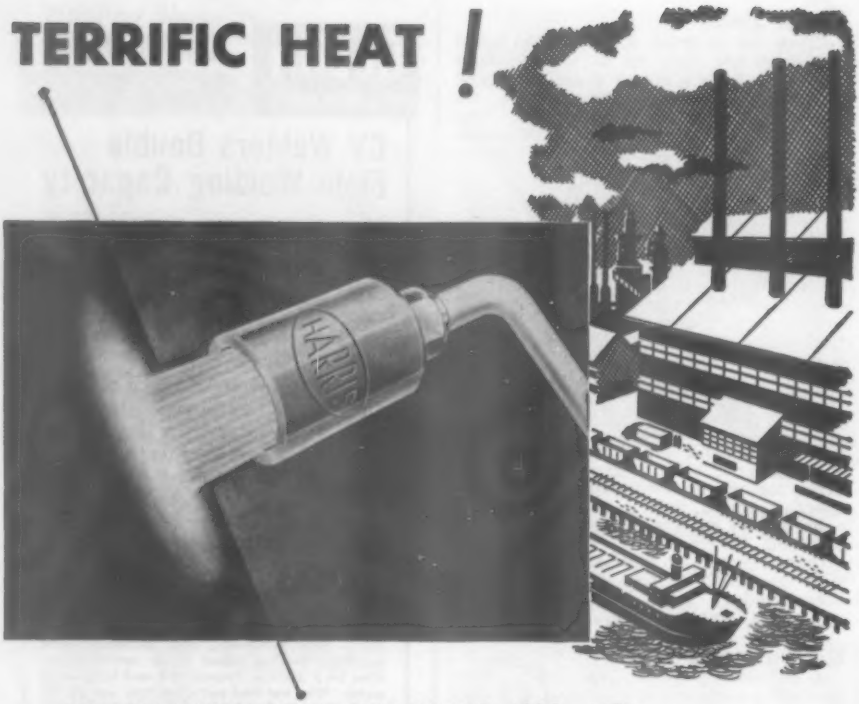
5

GLENN COMPANY — CONSTANT VOLTAGE PIONEERS
3134 E. 10TH STREET
OAKLAND 1, CALIF.
10228 SO. AVE. N.
CHICAGO 17, ILL.

which weldor
has the
*TWECO-LITE?
*the new ALUMINUM welding cable that weighs half as much, lasts longer and costs less
A Product of
TWECO PRODUCTS COMPANY
Wichita 1, Kansas

Circle No. 56 on Reader Service Card.

TERRIFIC HEAT !



HARRIS SUPER-HEAT TORCH NO. K23

Heat is the Prime Factor utilized in connection with Innumerable Metal Working Operations. While it is a fact that the Oxy-Acetylene Welding Torch is universal in its applications, there are many Operations requiring a much greater volume of Intense Heat than can be obtained from a Welding Torch.

A definite limitation exists relative to the amount of Oxygen and Acetylene Gases which can be safely mixed without danger of the Flame "Back-firing", due to the extremely fast Flame Propagation Characteristics of such Gas Mixtures. On the other hand, much larger volumes of such Fuel Gases as Propane, City Gas and Natural Gases can be safely mixed with Oxygen on account of their lower rate of Flame Propagation. It is evident the larger the volume of Gases mixed, the greater the Flame and resulting Heating Value. This produces the truly phenomenal results achieved by this Harris Super-Heating Torch.

The applications of this Harris Torch are unlimited, where large volumes of Intense Heat are required, either as a Portable or Stationary Unit. In places where Massive Shafts are to be Straightened; Large Size Pipe Bent; Flanging or Straightening of Steel Plates; Brazing Heavy Copper Pipe, etc., etc., this Harris Torch, with its TERRIFIC HEAT, is the answer.

HARRIS 51 ANNIVERSARY 1903

SEND FOR DESCRIPTIVE FOLDER NO. 540710

THE HARRIS CALORIFIC CO.

CLEVELAND 2, OHIO

Circle No. 57 on Reader Service Card.

Exchange of ideas between Europe and America help develop better welding products . . .

International Welding Ideas

FIFTY years after the beginning of research on the reduction of welding heat input, a new "anniversary" laboratory, in Flushing, New York, is the center of a network of similiar laboratories in Switzerland, France, England and Germany.

In an industry where research has been synonymous with progress, Rene D. Wasserman, president of Eutectic Welding Alloys Corporation has developed a fresh approach to the problem. By commuting between the company's four foreign laboratories, and interchanging ideas, his concept of progressive welding research has been broadened.

Five Labs Do More Work

Although mere multiplication of research facilities does not necessarily mean greater efficiency, it does seem logical that five laboratories can solve five times as many problems. The result of such cooperative effort, and the friendly competition which exists between research teams here and abroad, must eventually be better, more efficient welding products.

1 Welding laboratory in Paris is one of four associated research centers. Ideas developed here are sent to America.

2 American research-production teams discuss European developments. Here, Rene D. Wasserman (center), leads discussion.

Dr. G. M. Blanc, head of one of the Eutectic research centers in Europe is now chairman of an inter-European committee studying brazing standards.

A recent addition to the local laboratory, a new, high-powered microscope ordered by Mr. Wasserman during one of his trips abroad, has helped to short-cut current technical investigations. More comprehensive studies of the

3 Technical teams actually test welding techniques suggested by research groups. Students in this welding class room get a chance to try out developments.

4 Techniques are explained to operators in 2-hour recording. Here, Richard Hallistad, sales engineer, and J. P. Coughlin, assistant-to-the-president, check a recording.

effects of welding heat have been started in Europe. These studies, continued in this country, will result in the availability of better coatings and improved electrodes for American industry.

This continuing research program, utilizing, as it has, some of the best metallurgical brains in both Europe and America, is now in its 50th year at Eutectic. In a literal sense welding research has made it possible for every industry to save time and money in produc-

If all the INDEPENDENT Acetylene CYLINDERS

we have built were filled at one time they would hold more than

60,000,000

cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen storage cylinders available in 12 ft. & 20 ft. lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

WE INVITE YOUR INQUIRIES

INDEPENDENT ENGINEERING COMPANY, Inc.

Manufacturers of

CONSULTING · RESEARCH · DESIGNING

CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

O'Fallon 2, Illinois

Circle No. 58 on Reader Service Card.

tion, fabrication and maintenance. It will continue to do so—and to expand the scope of welding throughout every category of American industry. By the free exchange of ideas and information between Eutectic laboratories here and abroad, Mr. Wasserman hopes to contribute to this expansion.

According to Eutectic management officials, a primary reason for the success of this company, and its favorable position at this anniversary period, is the activity of its District Engineers. Numbering some 350, these men act as on-the-spot trouble shooters and technical consultants to a wide cross section of industry. No plant or department has been too small to merit the services of these trained engineers.

California Distributors Elect Officers

W. V. "Doc" Raymond, president and general manager of California Welding Supply Co., Stockton, Calif., was elected president of the Independent Welding Distributors Association at a recent meeting. Otto Koll, Welders Supply Service, Modesto, was elected vice president and M. J. Andrews, secretary-treasurer.

The I.W.D.A. is an association of 25 independent welding supply distributors in the Western United States, Alaska and Hawaii.

THIS IS BASIC

The bitterness of poor quality lingers long after the sweetness of low price is forgotten.

It is to your best interest never to forget that there is no Santa Claus in the RESISTANCE WELDING ELECTRODE business.

Whenever price is CUT, quality is CUT! The reasons given you for price cutting are those the price cutter wants you to hear. That is the time to beware, because substitutions can be made in tip manufacture that cut cost and quality, yet are not apparent in the finished product until it is used.

No one can do business long without a *profit*. When a tip price is CUT, something is taken out. That something is QUALITY . . . and its loss will be in proportion to the price cut. If you buy cut-price tips, expect to get cut-quality tips. It is basic that you never get more than you *pay* for.

You EXPECT more from TIPALOY and you GET more! TIPALOY electrodes cost more, but for a slightly higher initial cost these are your major gains:

1. 30% to 100% longer electrode life!
2. Less down-time and maintenance!
3. More welds per electrode!

Write for the story of Tipaloy today! Distributor franchises available!

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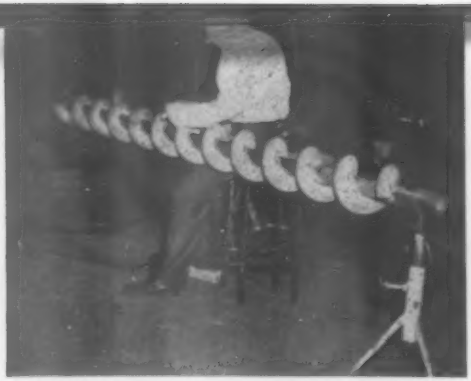


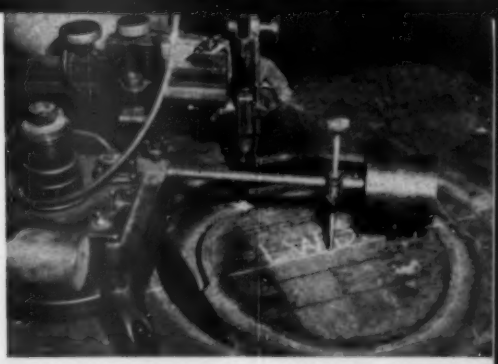
Fabrication and repair are two typical jobs done by oxy-acetylene flame. These include welding sheet metal electrical outlet box (above, top) and repair of aluminum casting.

Hardsurfacing and build-up with oxy-acetylene flame includes hard facing screw conveyor blade edge with cobalt-chromium-tungsten alloy (above, top) and build up of worn railroad frogs.

11 Hints on Using Oxy-Acetylene

by JAY BLAND, Senior Project Engr.
Engineering Research Department
Standard Oil Company (Indiana)

THE basic material of construction throughout the petroleum industry is steel, and one basic tool used in steel construction is the oxy-acetylene flame. Its widespread use is traceable to its physical characteristic; that of providing a localized source of heat hot enough to melt the most refractory of metals. Its scope makes it possible to weld, braze-weld, braze and cut most commercial metals and alloys, including the less frequently used precious metals. The flame can also provide a reducing atmosphere to protect sensitive steels, or it can be adjusted to provide a neutral or even an oxidizing atmosphere.



Automatic flame cutting is easy with special fixtures. Here outlet holes are cut in straight pipe (above, top) while portable unit cuts holes in vertical shells and then bevels them.

Mechanized equipment is important. Operator positions torch vertically as inserts are cut from 2½-inch plate (above, top). Auxiliary torch furnishes more preheat.

Flame for Welding and Cutting

Flexibility of the various processes, and portability of equipment used are significant among its many advantages. Industry demands, in addition, economy of operation. The oxy-acetylene flame processes have this commercial virtue.

The extent to which it is used can be estimated by considering the volume of gases consumed. During an average week, the Standard Oil Company refinery at Whiting, Indiana, will use about 11,500 cubic feet of acetylene and 27,500 cubic feet of oxygen. These figures indicate that a considerable amount of oxy-acetylene cutting is carried out, since for most flame processes, other than cutting, the volumes of each of the gases would be approximately equal.

At this same refinery, oxygen and acetylene are piped into the

Brazewelding for production and repair is important job for oxy-acetylene flame. Cast iron pump clamp is repaired (above) using high zinc brass filler metal. Dissimilar metals—steel nipple and malleable iron elbow fitting—are joined by brazewelding (below)

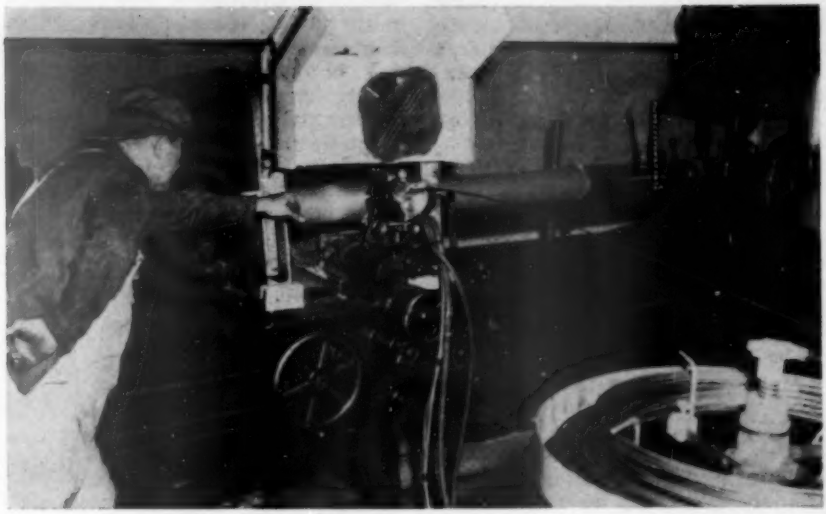
welding shop from a manifold system of 20 oxygen and 12 acetylene cylinders. The usual two cylinder buggies are spotted around the refinery at various field welding booths, and at each process unit during maintenance and construction operations. A total of about 60 such buggies are currently being used, with an equal number being prepared to satisfy present requirements.

12 Welding Operations

The Whiting refinery welding shop regularly utilizes the services of twelve qualified oxy-acetylene welding operators. These men are able to handle a wide variety of flame processes. In addition, eleven men work only on oxy-acetylene cutting. Cutters do the major portion of plant disassembly operations, and in many instances they have to perform oxy-acetylene cutting under adverse conditions, at high elevations and in all kinds of weather.

Frequent Flame Cutting

Many fabrication, maintenance and repair problems which arise in a refinery probably have been encountered in other industrial plants. Specific usages will vary but the questions at issue will have a marked similarity. At the Standard Oil Whiting refinery, the most extensive use of the oxy-acetylene flame is for the cutting of steel. The oxy-acetylene cutting process provides rapid preparation of plates and piping for subsequent fabrication, with a minimum of touch-up and at minimum cost. The frequent changes which follow new developments in refining processes, as well as the more extensive modifications which attend plant expansions, also demand the use of the oxy-acetylene cutting



Oxy-acetylene spray metallizing of pump shaft is done in lathe. Exhaust duct travels with lathe carriage.

process for rapid disassembly operations. Equipment used is both manual and machine operated.

In addition to cutting, the Whiting refinery employs the oxy-acetylene flame in brazing, braze welding, welding, flame-priming, low temperature stress-relieving, spray metallizing, and hard-surfacing.

Weld Various Metals

Oxy-acetylene welding in the refinery has wide application, even though the welding of steel is generally limited to sheet metal and to small diameter pipe. Sheet metal applications include both black and galvanized iron. Other uses include the repair of cast iron parts with cast iron filler metal; the welding of light gauge stainless steel; and the repair of various bronze alloy pump parts.

Typical of the oxy-acetylene braze welding operations are the salvaging of broken machine tools and similar equipment that otherwise might have had to be scrapped. A lot of oxy-acetylene brazing, using silver alloy filler metals, is done at the refinery. Special equipment used in research projects require brazed connections to assure tight joints between the various vessels and pipes which make up the equipment. Brazing also is used for joints requiring low electrical resistivity. Hard surfacing is another process requiring application of the oxy-acetylene flame, particularly in the building up of bronze or steel surfaces for wear resistance, using aluminum bronze filler metals. Cast bronze pump valves and various types of steel valve gates are conditioned in this manner.

The refinery has equipment for spray metallizing, using the wire method. This process, which incor-

porates an oxy-acetylene flame for melting of the wire, is used extensively for building up worn pump shafts. The process produces excellent uniformity of deposit and minimizes subsequent finishing operations.

Flame Straigtening Jobs

Refinery personnel have used the oxy-acetylene flame for flame-straightening jobs, and at various times for preparation of rusted or scaled steel plates and low temperature stress-relieving of structures too large for furnace stress-relief treatments.

Many of these oxy-acetylene cutting or welding operations are being performed within the refinery, near products which are highly flammable. Therefore, it is extremely important to have established and to maintain firm standards of safety for the use of oxy-acetylene equipment, and to determine the specific work areas which are completely safe for any welding or cutting operation. These safety standards are adhered to rigorously, and operators will not light an oxy-acetylene flame until assurance has been given by a qualified inspector that safe conditions have been established.

BRAZING AT CATERPILLAR

(Continued from Page 48)

penetration of brazing alloy. Joint clearance of $\frac{1}{64}$-inch is used.

Complete assemblies are subjected to the same rigid inspection.

Induction Brazing

In oil line tubes for diesel engines, steel fittings with ground faces are brazed to welded steel

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tubing. Here, $\frac{1}{16}$-inch diameter preformed low temperature silver brazing alloy rings are used to join parts.

After a thorough degreasing of component parts, they are fluxed and positioned in brazing fixtures which accommodate five units each and preforms are slipped on tubes. Heat is applied after fittings are positioned and is maintained until alloy melts and flows.

Parts are held in fixture until set and then water cooled. While they are cooling, five additional units are brazed.

Braze Stellite to Forgings

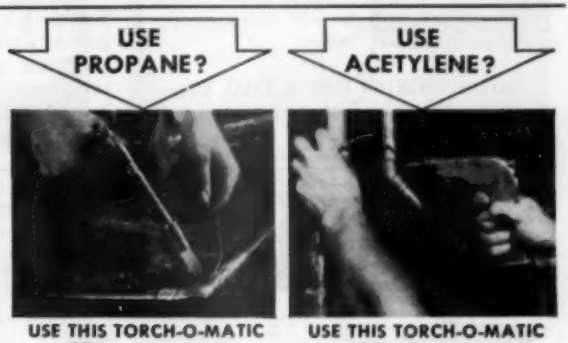
One of the most interesting brazing applications at Caterpillar is the brazing of stellite wear pads on lever assemblies. A $\frac{1}{16}$-inch deep relief with a $1\frac{1}{4}$-inch radius is first milled in the steel forgings. Parts are thoroughly degreased and care taken to keep fingerprints off any surfaces to be brazed.

A temperature indicating flux, which has been specially compounded to promote wetting action on tungsten carbides, is then applied to the forging which has been positioned in a six station brazing fixture. Ribbon brazing alloy which is .005 inches thick and measures $\frac{3}{4}$ by $\frac{1}{2}$-inch is placed in the relief. The underside of the stellite insert is then fluxed and placed on top of the brazing alloy. A clamp is then applied to hold alloy and insert in place for brazing.

Heat is first applied to the underside of the forging and then moved upward until heat of forging and stellite insert has been equalized at about 1350° F at which point brazing alloy melts and flows.

Units are kept in fixtures until red heat has dissipated.

Whichever Torch-o-matic you use— exclusive trigger-control saves you time, saves you fuel!



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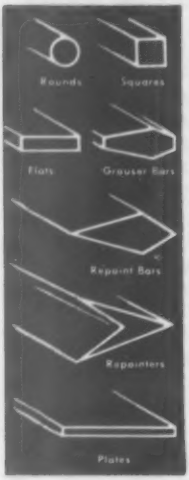

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WELD STAINLESS STEEL . . .

(Continued from Page 54)

welds) and sent to the Atomic Energy Commission Headquarters.

Extensive Testing

Each tank was subjected to an internal hydrostatic pressure test of 50 psig, and the internal pipe coil to 500 psig. Following these hydrostatic tests, the vessel and coils were given a Halogen Snifter Test, using a mixture of Freon and inert gas at a pressure of 50 psig. The weld areas were traversed by the probe of a Halogen vapor analyzer capable of detecting leaks as small as 1 x 10-6 cubic centimeters per second.

Upon the satisfactory completion of these leak tests, all internal welds and adjacent heat affected areas were tested with the acetoacetanilide free iron test. To perform this test, solutions of acetoacetanilide in acetone, and of ammonium acetate in distilled water were applied to the surfaces to be tested with a paint brush or a small control of welding technique. de-

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scribed above, longitudinal and circumferential weld seams were 100% radiographed. Following this operation, and any weld repairs necessitated by this examination, the interior and exterior of all longitudinal and circumferential seams were further reinforced with ¼" thick stainless steel bars of Type 316 ELC, continuously welded to the tank walls, to provide an additional life extension factor for the tanks.

To maintain a permanent "file" of the welds for future studies and atomizer. The surface turns blood red in three minutes or less if it contains free iron. If the dry surface is white, gray or light pink in color, the test for iron is negative. Those surfaces which exhibit a positive iron indication, must be thoroughly cleaned, using 15-20% Nitric Acid until the satisfactory test is passed.

The vessels were now ready for their final destination. All openings were closed by means of wood plugs, pipe caps and plastic covers taped to produce a good seal against atmospheric contaminents. The tanks were cradled on freight cars and care was exercised so that steel tie-down straps were not in contact with the stainless steel shell at any point.

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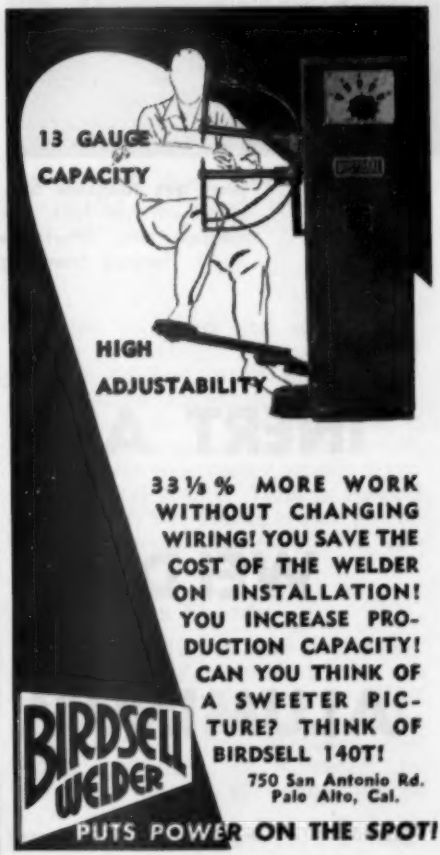
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Inert gas tungsten arc welding fabricates sturdy, lightweight aluminum truck bodies. Process requires no flux, minimizes oxide formation and burn through.

Inert gas tungsten arc process makes circumferential weld on aluminum fuel tank mounted on miniature turning roll for easy rotation (left). Short wave radio arrestor is used to dampen interference from high frequency arc starting (right).

INERT ARC WELDING ALUMINUM

FREIGHTLINER Corporation's new plant in Portland, Oregon, covers approximately 50,000 square feet and utilizes some of the most progressive welding ideas in the industry. This firm pioneered use of lightweight metals in over-the-road heavy-duty trucks and tractors. Largely through their own production methods, and by using aluminum and its alloys, the company cut down truck weight to a minimum. The big, cab-over-engine trucks haul heavier pay loads and demonstrate superior durability during long periods of road testing under actual hauling conditions.

From a welding standpoint, a number of very difficult problems

Portable pneumatic and electric tools and disc-type and straight wheels are used to grind and finish all welds.

A thorough visual inspection is given to welded cab. Welds are also tested for physical and mechanical properties.

faced the company when it began to make a lightweight truck from aluminum. These included necessity for thorough cleaning to remove corrosive fluxes, ever-present oxide formations and narrow melting range which increased possibility of burn-through. These were all solved by use of inert arc welding which requires no flux, uses an inert gas to shield welds from atmosphere and provides instantaneous welding heat to minimize burn-through. In addition, smooth, good-looking welds obtained with the process required a minimum of grinding and finishing.

Fabrication of trucks and component parts calls for highly-skilled operators and some intricate welding. Circumferential welds on fuel tanks illustrate an interesting application of the inert arc process. Circular tank is placed on a miniature turning roll —actually four caster wheels fixed to a metal frame. Tank is rotated manually by the operator as he simultaneously feeds filler rod into the weld.

Welding Is Speedy

No time studies have been made on the larger tanks, but here are some studies made on two smaller tanks: 224-inches in .66 hours for inert arc welding 70-gallon fuel tank (18-inches in diameter and 60-inches long); 421-inches in 2.03

hours for inert arc welding 175-gallon fuel tanks. (22⅞-inches in diameter and 107-inches long).

Aluminum from .051 to ½-inch, 61ST, is used in various components. Aluminum over ¼-inch thick is preheated in a furnace. Steel wool is used for pre-cleaning weld areas. Five percent silicon aluminum filler rods and thoriated tungsten electrodes are utilized because they can take more heat and are less likely to become contaminated. Amperage depends on thickness of materials and, to some extent, on operators.

Careful Weld Shop Layout

Welding areas were carefully laid out before the new plant was built. Main area is the aluminum cab sub-assembly. High frequency 250, 300 and 500 amp machines are set against walls or conveniently located beside welding tables and work benches.

Outlets, 110 and 220 volts, are located on the walls or floor every 20 feet. There are similar outlets in the smaller welding area of machine casting (aluminum) sub-assembly. Most of these outlets are located under a bench, readily accessible but out of the way.

In cab sub-assembly and assembly, where most grinding and polishing is done after welding, compressed air and electric lines hang straight down from overhead beams. There are few cords or lines anywhere to trip operators or mechanics.

Use Jigs and Fixtures

Special jigs and fixtures are used mainly in cab sub-assembly. One jig bends door frames to shape. After doors are finished, they are put into rack located between cab sub-assembly and assembly. Thus, there is little material handling in the welding areas or elsewhere. Doors are simply put in from one side and taken out on the other.

Buckling and distortion in welding aluminum decks is overcome by bending material in reverse before welding. After tack welding, finish welding is done with part clamped in fixture. A wedge incorporated in fixtures gives desired contour.

Steel wool is used to remove oxide layer which may be present after welding. Portable electric grinders and sanders are used with discs and welds to grind and finish oversize welds.

Test Sample Welds

Periodically, samples of welds on various parts are taken to commercial laboratories for physical and mechanical tests. These are particularly important in truck construction where high strengths are required.

Because aluminum is used to such a great extent, metallic arc welding is used only for putting in cross members, drive lines, some types of battery boxes and for radius rods to hold axle in place for rear suspension. Steel used ranges from ⅛ to ⅜-inch thick.

New Plant Makes Electrolytic Hydrogen

Completion of a new electrolytic hydrogen installation has been announced by the California Oxygen Co., Sacramento, Calif. In addition to electrolytic hydrogen, the firm manufactures and sells acetylene oxygen, nitrogen and liquid oxygen.

Welding Supply Distributors Form Baltimore Group

Representatives of 12 Baltimore welding supply distributors met recently to form the Baltimore Welding Supply Association. The group was formed to carry out objectives of the National Welding Supply Association on a local level. A. C. Earlbeck, Earlbeck & Landrum, Inc., and A. C. Axtell, Essex Welding Equipment Co., Newark, and N.W.S.A. district vice president, were guiding lights in formation of the group.

Following officers were elected: Mr. Earlbeck, president; L. H. Mathews, Guilford Welding Supply Co., vice president; W. C. Landrum, Earlbeck & Landrum, Inc., secretary and Fred Gaebler, Prest-O-Baltimore Co., treasurer. Directors include Fred Blenckstone, Baltimore Oxygen Supply Co.; Randy Cooke, Arundel Sales & Service Co. and Harry Fountain, Welders Supply Co.

Other member companies include Chesapeake Welding Supply Co., Harris Calorific Sales Co., Hobart Welder Sales Co., Southern Oxygen Co., Trippe Supply Co. and R. S. Weiss Co.

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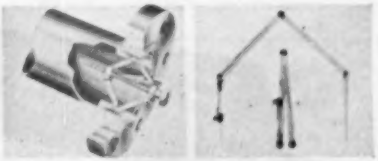

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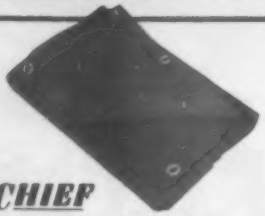

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NEWS

from page 22

Renfroe Company Exhibits

Exhibiting their complete line of steel lifting clamps at the recent Material Handling Show in Chicago, was J. C. Renfroe & Sons, Inc., of Jacksonville, Fla. Shown here are Bob Renfroe (right) and Ralph Chavers, sales engineer (left).

Metal and Thermit Expands Facilities

A combined general office, research and distribution center representing a total investment of over $2,000,000 will be established in Rahway, N. J., by Metal &

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Thermit Corp., H. E. Martin, president, has announced. Located on a 17-acre tract, it is scheduled for completion in April, 1956. At that time, company's executive offices will also be moved to new quarters at 100 Park Avenue, New York City.

Pohndorf Named Sales Exec. at National Welding

Ernest L. Mathy, chairman of the Board, National Welding Equipment Co., San Francisco, advises that the Board of Directors has elected Henry L. Pohndorf, Vice President in Charge of Sales. A graduate of M.I.T. and in the welding industry for many years, Mr. Pohndorf has been Chief Engineer for the company and recently, General Sales Manager.

Dave Rankin Joins Rankin Mfg.

Dave (Bud) Rankin, Jr., has joined Rankin Mfg. Co., Alhambra, Calif., and will assume duties in the Ranite National sales office. Son of D. R. Rankin, president, Dave Rankin recently graduated from the University of Southern California where he took two years of post graduate work.

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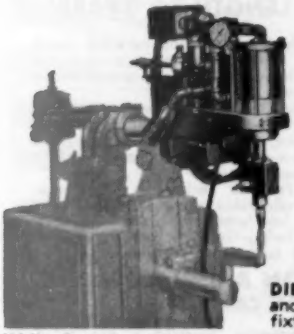

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Destaco Celebrates

From the happy faces here, it's easy to see that everyone enjoyed themselves at the recent 40th anniversary celebration of Detroit Stamping Co. in the company's main plant in Detroit. Here, Mrs. Gloria Roberts, wife of the founder and formerly a president of the company, accepts presentation of roses in acknowledgement for the part she played in the success and expansion of the corporation.

Looking on are (left to right) William H. Roberts, vice president; Glendon H. Roberts, president, and his wife, "Beebee."

SEE PAGE 10 FOR VALUABLE FREE LITERATURE AVAILABLE

ANOTHER FIRST BY CARLSON!

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CARLSON *Super Chief* 16 FEET LONG

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Less Apt to Burn: Handy re-wind crank moves the 16-ft. blade smoothly in or out of case—without backlash—to protect blade from torches.
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Gunzelman To Manufacture Automatic Welding Equipment

Willard (Curley) Gunzelman, associated with engineering and fabrication of automatic welding equipment for the past 12 years, has announced formation of a new manufacturing company.

Known as World Electric Company, with engineering and sales offices at 8001 Carnegie Ave., Cleveland 3, Ohio, the company will market a complete line of equipment carrying the "Welco" trade mark. Engineering, servicing and consultation services for all types of welding operations will be available.

Included in the new Welco line of standard and special machines are mast and boom types from five feet lift and ram to 20 feet lift and ram, new type seam welders, head and tailstocks and constant centerline turning rolls. Experienced

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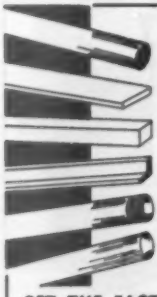

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PIPE

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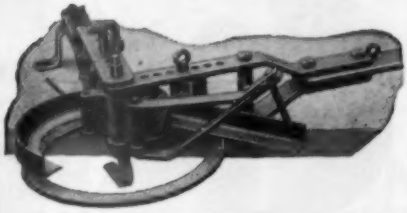

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representatives have been appointed in most major marketing areas. Equipment for spot welding, high-production resistance welding, and metallic, submerged and inert automatic arc welding is in current production.

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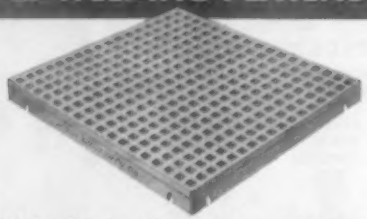

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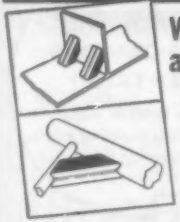

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